HOUSE OF COMMONS SESSION 1997–98

SCIENCE AND TECHNOLOGY COMMITTEE

First Report

THE IMPLICATIONS OF THE DEARING REPORT FOR THE STRUCTURE AND FUNDING OF UNIVERSITY RESEARCH

Volume II

Minutes of Evidence and Appendices

Ordered by The House of Commons *to be printed*
25 March 1998

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HC 303—II

The Science and Technology Committee is appointed under Standing Order No 152 to examine the expenditure, administration and policy of the Office of Science and Technology and associated public bodies.

The Committee consists of 11 Members. It has a quorum of three. Unless the House otherwise orders, all Members nominated to the Committee continue to be Members of it for the remainder of the Parliament.

The Committee has power:

(a) to send for persons, papers and records, to sit notwithstanding any adjournment of the House, to adjourn from place to place, and to report from time to time;

(b) to appoint specialist advisers either to supply information which is not readily available or to elucidate matters of complexity within the Committee's order of reference;

(c) to communicate to any other such committee and to the Committee of Public Accounts and to the Deregulation Committee its evidence and any other documents relating to matters of common interest; and

(d) to meet concurrently with any other such committee for the purposes of deliberating, taking evidence, or considering draft reports.

The following were nominated Members of the Committee on 14 July 1997:

Mr David Atkinson
Mr Nigel Beard
Dr Michael Clark
Mrs Claire Curtis-Thomas
Dr Ian Gibson
Dr Lynne Jones
Mr Nigel Jones
Dr Ashok Kumar
Mrs Caroline Spelman
Dr Desmond Turner
Dr Alan W Williams

Dr Michael Clark was elected Chairman on 30 July 1997.

The cost of printing and publishing this Volume is estimated by The Stationery Office at £9,330.

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1. The Institution of Electrical Engineers
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21. The Royal Society

MINUTES OF EVIDENCE

TAKEN BEFORE THE SCIENCE AND TECHNOLOGY COMMITTEE

WEDNESDAY 5 NOVEMBER 1997

Members present:

Dr Michael Clark, in the Chair

Mr Nigel Beard	Dr Ashok Kumar
Dr Ian Gibson	Mrs Caroline Spelman
Lynne Jones	Dr Desmond Turner
Mr Nigel Jones	Dr Alan W Williams

Memorandum submitted by the Office of Science and Technology (OST)

1. The Government is presently considering the research aspects of the report by the National Committee of Inquiry into Higher Education (NCIHE) in the light of representations and responses received following its publication on 23 July 1997. The same applies to the further report of the Scottish Committee under the chairmanship of Sir Ron Garrick which contains a number of other recommendations relating to research in Scotland.

2. As well as Chapter 11 on supporting research and scholarship, other chapters of the main report cover research matters such as Chapter 13 on the local and regional role of higher education, Chapter 15 on the management and governance of higher education and Chapter 16 on the pattern of institutions which provide higher education. Many of these matters fall within the individual responsibilities of the Universities and other Institutions (HEIs), the Funding Councils, the Research Councils and the Education Departments for England, Scotland, Wales and Northern Ireland. Further, the various recommendations addressed to the Government about funding research need to be considered in the context of the current comprehensive spending review.

3. We have therefore sought to answer the questions posed by the Committee in the Clerk's letter of 29 September 1997 in as factual and helpful way as these circumstances presently permit. We hope the following will assist the Committee by drawing attention to issues which underlie the various questions raised.

Preamble—University Research Funding

4. University research today is a major undertaking with an annual turnover of some £2.5 billion. Around 40 per cent comes from sources other than the two sides of the dual support arrangements (1) and the amounts have been growing notably in recent years. Between 1990–91 and 1995–96 (the most recent year for which data is available), funding grew in real terms by 47 per cent from the Charities, by more than double from the EU, and by 25 per cent from UK businesses (2). The number of Universities and researchers has also grown significantly (3 and 4).

5. The nature, dynamism and sophistication of the research being performed is also adding to the complexities of research management and financing that face researchers and managers alike. For instance, in the capital or laboratory intensive areas, there is evidence of a premium cost that has to be met in replacing or maintaining equipment to stay at the leading edge. In such areas, not only can the equipment become redundant quickly but new, pioneering or next generation projects can require significant expenditure up front on infrastructure such as buildings and facilities eg to comply with Health and Safety requirements (5).

6. Universities and other HE Institutions therefore have a complex and dynamic portfolio of costs and income streams to manage. The more research intensive and extensive Universities in particular deal with a large and varied range of sponsors in the UK and elsewhere under many differing sets of terms and conditions. Further, Research Councils, Industry and the Charities are increasingly looking to develop their relationships and funding arrangements with Universities on the basis of a genuine partnership in which the Universities are contributing partners and which require clear, robust accounting of costs and funds.

7. Under the dual support arrangements, Universities receive unhypothecated block grants as core public funding to support their research activities and infrastructure. Subject to certain conditions, Universities have discretion over the use of these grants which are currently provided from the respective budgets of Education Departments for England, Wales, Scotland and Northern Ireland. The grants are allocated by formula and in the case of England, Wales and Scotland fall within the direct responsibilities of the respective Funding Councils for Higher Education. Universities also receive further funding from this side of dual support through specific, non formula funding initiatives. For instance the Funding Council in England (HEFCE) is

currently preparing to launch two new initiatives, respectively to help Universities improve their estates and refurbish research laboratories (6). Along with the other Funding Councils and the Research Councils, HEFCE is currently participating in the 1997 Joint Research Equipment Initiative.

8. One of the founding concepts of this side of the dual support was to support well found laboratories in which researchers were free to research areas of their choosing. Universities and their staff were of course free to seek further funding for their research activities from other sources such as the Research Councils, the Charities and Industry. The other side of dual support, namely funding from the Research Councils, was therefore originally limited to supporting the additional direct costs of projects and programmes approved by "peer" committees. A recent report by the Parliamentary Office of Science & Technology describes the significant changes in the circumstances and operation of the dual support which have occurred since (7).

9. Most recently, new arrangements, known as the Dual Support Transfer, were introduced in 1992 to promote greater awareness of the true costs of research and to deal with what had become an increasingly unclear and confused dividing line. This change involved a shift in the balance of the budgets in favour of the Science Budget to enable Research Council grants to cover more of a supported project's direct costs and additionally to make a contribution to its indirect costs. This contribution to indirect costs, or overheads as they are alternatively called, was set at an average. As such, it does not represent the actual indirect costs of a supported project in the Institution concerned. Any actual shortfall is met from the applicant Universities' general funds including its block grant money. Following a review, a further adjustment was made in 1996 to achieve the intended balance by increasing the Research Council contribution to indirect costs from 40 per cent to 45 per cent of the direct staff costs awarded in the grant, again as an average contribution.

10. Research Councils are not passive grant awarding bodies. As well as through grants for projects and programmes, they are also pro-active in supporting research infrastructure in a variety of ways, for instance equipment pools, shared facilities, fellowships, specific infrastructure grants, interdisciplinary research centres and the like.

11. Turning then to the Committee's specific questions

Question 1: *What would be the advantages and disadvantages of creating an independent advisory council on national research policy, as suggested at para 11.105 of the Dearing report? Does the OST see a need for such a body and, if so, what difference would this make to the work of the Council for Science and Technology and the Science and Engineering Base Coordinating Committee? What is the current remit of these two bodies in developing an "objective overview for research support in higher education"?*

13. These matters are currently under consideration. The remit of the Council for Science and Technology has not changed since the Council was first established following the 1993 White Paper on Science and Technology (8). The Council has taken a continuing interest in the issues of higher education. Having submitted detailed evidence to the NCIHE and met Sir Ron Dearing and other members of his Committee during their Inquiry, it is currently preparing advice to the Government on how to address the recommendations on higher education research.

14. Its terms of reference are presently *"To advise the Government on science, engineering, and technology (SET) issues, the balance and direction of Government-funded SET, taking account of international developments; and on the annual Forward Look of Government-funded SET, drawing as appropriate on the findings of the Technology Foresight Programme"*. The President of the Board of Trade on behalf of the Prime Minister is the Council's Chairman and the Government's Chief Scientific Adviser serves as her Deputy. There are presently 11 independent members, who are senior figures from the business and research communities.

15. The remit of the Science and Engineering Base Coordinating Committee is to *"to consider trans-departmental issues affecting the science and engineering base, referring, as necessary, to Ministerial and official committees on science and technology"*. The Committee's chairman is the Government's Chief Scientific Adviser and members comprise the Director General of the Research Councils, the Chief Executives of the Research Councils and the Funding Councils, and senior officials from the four education departments.

16. Under the federal structure of the dual support arrangements, the Committee's role is limited to one of coordination in accordance with the individual responsibilities of its constituent member bodies. Outside the Committee meetings, members of course interact daily in various groupings and in various ways on all the numerous matters and issues concerning the Science and Engineering Base (SEB). Committee meetings therefore serve for collective consideration of the key matters such as the overall monitoring of the dual support arrangements, the careers of contract researchers, postgraduate support and education, benchmarking the SEB, and the Dual Support Transfer Review (9).

17. The terms of reference, membership and mode of operation of both the Council and the Committee are presently being considered in the light of the NCIHE's report. Advice on research in higher education needs to be set in the context of science and technology as a whole. Among SEBCC members there are already very clear lines of accountability for their individual executive and other responsibilities.

Question 2: *Does the OST agree with the weaknesses identified by Dearing in the Research Assessment Exercise and, if not, why not? What is the OST's response to the re-balancing between teaching and research in the RAE suggested by Dearing?*

18. As the NCIHE clearly recognised and as further detailed in the POST report, questions about these exercises cannot be divorced from the quality related funding formulae in England, Wales, Scotland and Northern Ireland and the related policies concerning "selectivity".

19. Generally the RAEs in the UK are widely seen as world leaders in the assessment and promotion of research quality with an ever growing number of countries following or beginning to follow their example (10). The strong points of RAE are widely seen to include improvements in research quality, a more dynamic, competitive research environment and greater accountability, with the most recent exercise in 1996 resulting in a marked grade shift upwards.

20. Subject to consultation and modification each time such an exercise has been conducted in 1986, 1989, 1992 and 1996, RAE is now so well established and understood that any major changes could and should not be made lightly. Following a number of preparatory studies and circulars (11-14), the Funding Councils will shortly be commencing another extensive and open ended consultation exercise which will cover the two principal questions, namely:

- — should there be another RAE in the future, similar in nature to the previous exercises?
- — and, what alternative approaches might be taken instead for judging research quality for use in the research funding formula of the Funding Councils?

The exercise will also address such questions as the purposes, scope, form and processes of any future such exercise in the light of the NCIHE's report. Overall, it will provide the opportunity for further, careful consideration of all the issues involved.

21. First, there is the fundamental question of how best to allocate a fixed budget for block grant purposes. Apart from endorsing the existing principle of selectivity, the NCIHE report does not address in detail such key considerations as:

- — what balance should be struck in the concentration of funds through selectivity and what factors should determine this?
- — are the current levels adequate or not for maintaining the excellence of the UK research base and how can this be judged?
- — what should be the balance between block grant funding by formula and other non-formulaic approaches eg regarding the development of new pinnacles of excellence in the UK?

22. Second, there are questions over the effects of RAE on Universities and UK research. For instance:

- — are institutions focusing too much on research or being influenced too much by the RAE rules eg in order to win more for themselves in the only funding game open to them to play?
- — what are the effects on UK research and the UK's research base of RAE?
- — is too much pressure being placed on researchers to deliver results judged principally against the RAE yardsticks and time scales ie by the RAE criteria being used as performance indicators?
- — is RAE promoting risk aversion eg towards collaborative or interdisciplinary research which might prove harder for panels to assess than the traditional disciplines?
- — is the RAE in practice discouraging research work with industry and other forms of user engagement in research?

23. Lastly there are issues around the RAE process itself. Among them are consistency of standards across the various panels, the composition of panel members eg regarding international peers and business people, the treatment of collaborative, multi-disciplinary and interdisciplinary work and the assessment of research work which is industrially relevant, applied or close to market.

Question 3: *The Dearing Report states that "other means of funding .... will need to be found" if communications and information technology services currently provided to researchers by the Funding Bodies are to continue (para 11.42) Does OST agree? If so, what other avenues of funding are feasible? Is the charging system envisaged by Dearing the best method of providing extra funding?*

and

Question 4: *To what extent is the UK Joint Academic Network and its successors under "considerable strain" (para 11.43)? What can be done to reduce the strain on SuperJANET to improve its usefulness to researchers? What does the OST see as its own role in providing adequate information technology services to researchers?*

24. Through the Education Departments and the Funding Councils, financial support is provided to the Joint Information and Systems Committee (JISC) whose mission is to "stimulate and enable the cost effective exploitation of information systems and to provide a high quality national network infrastructure for the UK higher education and Research Council communities". OST does not therefore have a direct funding role in providing support to the information technology infrastructure required by researchers.

25. The Research Councils, use and subscribe circa £750,000 to this network and have a representative on the JISC and the Board of the operating body UKERNA. Additionally, the Research Councils support research in the fields of IT and Communications as part of their grant funding of specific projects, largely through the Information and Technology Programme of the Engineering and Physical Sciences Research Council (EPSRC), and through the Joint Research Equipment Initiative (see further below). The Research Councils also provide High Performance Computing (HPC) services to researchers. EPSRC are currently leading through a PFI approach the procurement of a new HPC service for introduction in 1998.

26. The NCIHE's report on these matters is currently being considered by JISC and its Funding Bodies. In mid 1998, JISC will be considering the costed options for providing protected bandwidth to researchers. It is the international bandwidths that are under pressure rather than JANET of SuperJANET as a whole. Spending on the international network has increased from £750,000 in 1993–94 to circa £7.5 million in 1997–98 and now accounts for a third of JANET expenditure. The rate of growth in the use of the international bandwidth has been growing threefold per year, although this is now nearer two and a half times. The international bandwidth has been increased from 2Mb to 53.5Mb for the American link and from 2Mb to 44Mb for Europe over the same funding period. There are proposals to introduce charges for academic use of the international bandwidth from the 1998–99 academic year. In addition the following steps have been taken to reduce transatlantic traffic:

(a) Some services from the USA have been mirrored on JANET to cut down the requirement for international usage; and

(b) Links have been set up with European and Commercial networks.

Question 5: *What is the OST's reaction to Dearing's recommendations regarding funding for research infrastructure and, in particular, to the proposal for a low interest loan scheme? Does the OST believe such a loan scheme to be feasible? What evidence does the OST have to indicate how willing industry and research charities would be to provide funding for such a scheme?*

27. Since publication of the NCIHE report, a number of charities, companies and such bodies as the Association of the British Pharmaceutical Industry and the Chemical Industries Association have stated publicly that they would not participate. As proposed in outline in the report, sponsors would contribute into a general fund administered by a third party. More recently however, the CBI has publicly supported the principle of the basic idea, namely of the Government establishing a loan fund for Universities to modernise the infrastructure in their top quality departments, drawing in sponsors and other contributions to such projects as they do now.

28. Although no comprehensive statistics exist, the extent and value of support in cash or in kind from such industrial and charitable sources for the recurrent and capital costs of the research infrastructure comprising support staff and services, buildings, facilities and equipment is undoubtedly significant. Such support is probably concentrated in the more research intensive Universities at least in terms of total values. The only firm figures available to OST concern the 1996 and 1997 Joint Research Equipment Initiatives involving the Research Councils, the Funding Councils and DENI:

- in 1996, around 250 applications were received with 172 being awarded a total of £25 million of public funds. This was matched by £25 million from private sources; and
- in 1997, 430 applications have been received. Awards will be announced later this year.

29. The 172 awards made in 1996 involved a total of 313 contributions of varying size from external sponsors, some of which were involved in more than one of these awards. Of these, 74 per cent came from industry, 10 per cent from charities or NHS Trusts and 16 per cent from other sources which included Government, local government, EU and university funds. The early signs are that these proportions are likely to be the same in the current 1997 round?

Question 6: *Does the OST agree that there is a funding gap between the costs of research and the combined funding available through the dual-support system? If so, what estimate has been made of the size of the gap? To what extent is the government responsible for meeting the indirect costs of (i) research funded by the Funding Bodies and (ii) research funded from other sources?*

30. The very nature of research and the requirements of researchers mean that demand for both public and private funds for research in Universities exceeds the inevitably limited amounts available. Further, research with external sponsors normally requires the participating University to contribute in some way or another. The terms attaching to any intellectual property rights, for example, might effect the financial arrangements for funding the work. Similarly, a University might wish to perform the research at less than full cost recovery in order to gain a less tangible but valuable advantage or asset, sometimes called an "intellectual loss leader". Overall, however, Universities must and do cover their costs and as autonomous Institutions, have full responsibility for all such decisions, including of course those on seeking funding from the Research Councils and other sponsors as explained in the preamble above. Among the more important questions in this context are therefore:

- how research and research costs are being met and managed by Universities;
- what is the balance to be struck between research staff related costs and the costs of maintaining and sustaining their research infrastructure? What are the yardsticks?
- if any, what effects are the current dual support funding formulae having on this balance? Do they encourage under investment in infrastructure?

31. The NCIHE report does not address these issues to any great extent, partly through pressure of time and partly because of the lack of any suitable data for the sector as a whole, eg regarding:

- the true costs of research in all UK Universities;
- the attribution of indirect costs to individual projects, or to the funding from external sponsors of research such as the Research Councils; and
- appropriate benchmarks for gauging the adequacy of infrastructure investment.

32. Accordingly, the estimates of the so called "funding gap" mentioned in the NCIHE report were necessarily based on some very broad assumptions concerning such critical variables as the relative costs of teaching and research, the proportions of academic staff time spent on research, the attribution of indirect costs—mostly property related, and the use of block grant moneys.

Question 7: *Does the OST support the suggestion that all Funding Bodies should consider adjusting their formula for funding research to contribute to the indirect costs of EU-funded research? If not, how should such costs be met?*

33. As described fully in the POST Report, the formulae currently used to determine the quality related research block grant for individual Universities employs a number of major and minor measures of research volume which are variously weighted. These formulae are purely allocation mechanisms and lie solely within the responsibility of the respective Funding Bodies.

34. The discretion of Universities over their use of these block grants extends of course to their participation in these EU Programmes which in being collaborative provide grants amounting to no more than 50 per cent of the full costs of each project. HEIs have choice of funding up to either (i) 100 per cent of the total additional direct or marginal costs plus a 20 per cent contribution to indirect costs or (i) 50 per cent of the full direct and indirect costs. On either count, recipients are responsible for covering the remaining costs in full accordance with the overarching Framework policy that grants should be an incentive to cross border collaborative research but should not distort their choice of research.

35. Nevertheless, the Government recognise that Commission funding mechanisms should more adequately reflect the cost of carrying out research, and it would be to the detriment of the UK research base if the level of allowable overheads were to ultimately prove a disincentive to UK University participation in the Framework Programme. For this reason, in the negotiation of the Fourth Framework Programme (FP4) the UK argued at Ministerial level for flexibility in the rate of overhead costs, to allow rates of over 20 per cent where this could be shown to be appropriate to the research in question. Although ultimately

unsuccessful, the Government will continue to emphasise the need for flexibility in the rate of overhead costs in the negotiations of the Fifth Framework Programme, with the aim of setting an increased maximum rate where it can be justified.

Question 8: *How best can interdisciplinary and collaborative research be encouraged? Does the OST agree that current funding mechanisms discourage such research?*

36. There has been extensive growth in collaborative research activity between and across subjects and disciplines as well as across departments and HEIs. One study estimates that by the year 2000 more than 50 per cent of UK scientific papers will be produced by three or more researchers collaborating across two or more institutions (15).

37. A wide range of mechanisms and measures already exist to promote and support these activities—collaborative, multidisciplinary and interdisciplinary research. The nature and extent of these activities, as well as the support required, are influenced by a number of continually changing factors operating at the level of:

— subjects or disciplines;

— individual researchers or research teams;

— individual Faculties and Universities; and more generally; and

— national and international.

38. More particularly, among the many potential obstacles to interdisciplinary research are reluctance to embark on risky research careers, especially if on short term funded contracts, departmental barriers, lack of facilities and lack of communication between disciplines. Although the NCIHE found no particularly persuasive evidence of a problem, a number of Universities have restructured and refocused to overcome such factors as departmental barriers.

39. As mentioned already in response to question 2, the planned consultation exercise about the future of the RAE will extend to interdisciplinary research. As the NCIHE report commends, the question of undertaking additional major studies or investigations will be considered by the relevant members of the Science and Engineering Base Coordinating Committee. Account will also be taken of a report which is due to be published shortly by the Scottish Universities Research Policy Consortium and sponsored by the Scottish Higher Education Funding Council.

Question 9: *How feasible are Dearing's proposals for an Industrial Partnership Development Fund? What evidence, if any does the OST have that industry would support such a fund? Would such a fund contribute to the regional and economic development as Dearing suggests?*

40. Numerous firms participate in various ways and to varying degrees in the many existing programmes which run at the national and regional levels including those involving support from the European Regional Development Fund and the European Social Fund. No records are held centrally to provide an overall picture of their involvement and contributions. But evaluation of programmes under LINK and of the Teaching Company Scheme for example have shown their value to all involved.

41. As previously explained, the proposals concerning an Industrial Partnership Development Fund are currently being considered in the context of the Government's Comprehensive Spending Review.

REFERENCES

1. HESA Resources for Higher Education 1995–96. The main research funding lines were:

Recurrent Grants	£803.2m	(34%)
Research Council Grants	£531.9m	(22%)
UK based Charities	£338.2m	(14%)
UK Gov. Bodies	£269.5m	(11%)
UK Business	£169.7m	(7%)
EU Gov. Bodies	£127.9m	(5%)
EU other	£19.8m	(0.5%)
Other	£96.7m	(4%)
Total	£2,356.8m	

2. Table 5.1: Science, Engineering and Technology Statistics 1997 (Cmn 3695).

3. There are now some 89 Universities in the UK compared to 31 either in existence or formation in 1962–63—72 in England + 13 in Scotland + two in Wales + two in Northern Ireland. [There are also 69 colleges of higher education and 378 other colleges providing higher education courses.]

4. For instance, in the 1996, 48,144 FTE research staff (72 per cent of total) were submitted for the most recent Research Assessment Exercise compared with 43,147 (76 per cent) in the previous exercise in 1992. And between 1987–88 and 1993–94 in the science and engineering costs centres, the number of research only staff in the "pre 1992" Universities increased by 44 per cent to 17,252 compared to an 18 per cent increase for all full time staff to 36,324 and just 0.02 per cent for teaching and research staff to 19,072.

5. *Survey of Research Equipment in United Kingdom Universities* by PREST/CASR, University of Manchester (June 1996).

6. HEFCE consultation circular 3/97.

7. *Striking a Balance—the future of Research Dual Support in Higher Education* (POST June 1997).

8. *Realising our Potential—a Strategy for Science, Engineering and Technology.* (CM 2250).

9. *Hansard* for House of Commons on 31 October 1996 at page 181.

10. *Nature,* Vol. 389. 11 September 1997.

11. *1996 Research Assessment Exercise—Conduct of the exercise: RAE Manager's Report* (May 1997—HEFCE ref. RAE 96 1/97).

12. *The impact of the 1992 RAE on higher education institutions in England* (May 1997—HEFCE ref. M 6/97).

13. *The impact of the 1992 RAE in Institutional and Individual Behavior in English Higher Education:* the evidence from a research project by Professor Ian McNay (May 1997—HEFCE ref. M 5/97).

14. *Consultation on Research Funding: Background Studies*—HEFCE M 20/96 (July 1996). This includes a study of selectivity by Segal, Quince & Wicksteed (SQW) Limited.

15. *The Changing Shape of British Science—STEEP Special Report 3,* October 1995.

22 October 1997

Examination of Witnesses

SIR JOHN CADOGAN, CBE, FRS, Director General of Research Councils, MR TONY QUIGLEY, Group Director of Science and Engineering Base Group, and MRS HELEN WILLIAMS, Group Director of Trans-departmental Science and Technology Division, Office of Science and Technology, were examined.

Chairman

1. Sir John, thank you for coming along to help the Science and Technology Select Committee on its inquiry into the Dearing Report. We are looking forward to hearing your evidence. I wonder whether I may start by inviting you to introduce the two colleagues whom you have with you today, Sir John?

(*Sir John Cadogan*) Thank you, Mr Chairman, we are delighted to be here. Thank you very much for inviting us to come along so soon in your deliberations. I should say that we have always found the comments of this Committee extraordinarily helpful, and no doubt that will continue.

2. I have no doubt that it will, Sir John.

(*Sir John Cadogan*) May I introduce Mrs Helen Williams. She is Group Director of the Trans-departmental Science and Technology Division of the Office of Science and Technology and has particular responsibilities for supporting the Chief Scientific Adviser in all his activities across Government. Tony Quigley, who reports to me, is Group Director of the Science and Engineering Base and I have to tell you that he is the person who spends a great deal of time making sure that the research councils behave efficiently and well and in accordance with government policy.

3. Thank you, Sir John. We do not generally like long opening statements, but if there was a short statement that you would like to make about the nature of your organisation it would be helpful.

(*Sir John Cadogan*) Yes, thank you. The Committee will appreciate that the Chief Scientific Adviser looks across Government whereas I as the Director General of the Research Councils have direct responsibility for the Science Budget as it relates to the seven research councils, the Royal Society and the Royal Academy of Engineering, and in that I have to give advice directly to Ministers on the strength of the Science Base, how much money is needed to carry out government objectives through the research councils and the Royal Society and the Royal Academy of Engineering, to advise on the distribution of that, to advise on how to get the cash—a very important part of my job, I would say perhaps the most important part, to make the case. Money does not come to us for nothing, we have to work for it to make the case—and also, once the money is distributed, to ensure that the research councils operate efficiently and in accord with government policy.

4. Thank you very much indeed, Sir John. Perhaps I may then ask you the first question, which I think is relevant to your opening comments. I wonder whether you could let us know how successful the Science and Engineering Base Co-ordinating Committee and the Council for Science and Technology have been in advising the Government on research policy and perhaps coupled with that, is there a need for a further body as proposed by the

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Dearing Report, in his words, to "advise the Government on the direction of national policies for the public funding of research in higher education"?

(*Sir John Cadogan*) It is, of course, for Ministers to decide whether a further body is needed. I note that Dearing mentioned the possibility of a third body right at the end of the report without actually presenting a great deal of argument for it, and this is quite reasonable because, as they themselves said, in the time that was available they did not have time to investigate what the Council for Science and Technology did or what the Science and Engineering Base Co-ordinating Committee did. The Science and Engineering Base Co-ordinating Committee is chaired by the Chief Scientific Adviser and it is a co-ordinating committee. It has many sovereign bodies on it, six funding research councils, each of whom have their own royal charter, and they are represented by their chief executives, I am a member, we have the chief executives of each of the funding councils, who, of course, are statutory bodies again with their own funding, and, indeed, we have representatives of Department of Education in England, the Scottish Office, the Welsh Office and the Northern Ireland Office, so these are all different bodies all with financial budgets which are theirs and theirs alone. Therefore, you can see that it is quite important to have a co-ordinating committee so that, first of all, we keep each other informed. If there is a problem arising at one end of the organisation which could impinge on another, then this is the place where it can be discussed. A classic example, an excellent example, was the question of how much money should be transferred with a research grant to a university in the form of overheads from a research council. The funding council would have one view, the universities would have another view, the research councils would have another view. SEBCC is where these discussions take place and, indeed, where accord is reached. An item which exercised your predecessor Committee, Mr Chairman, and, indeed, the corresponding Committee in the House of Lords, if one is allowed to mention that body, is this question of what happens to researchers who are on short term contracts.

5. Of which there are more and more, we understand?

(*Sir John Cadogan*) Of which there are more and more, yes, and they are a crucially important part of the Science Base. The research councils in many cases are the people who provide the money, but the universities are the employers. Therefore, it was important to work out a concordat between all the interested parties to see that frankly these people got a fair deal, not that many of them were getting a bad deal, but some apparently were, and this is where the Science and Engineering Base Co-ordinating Committee put in a tremendous amount of work. There, of course, it had to interact not only with the funding councils, the universities and the research councils but also with the charities. I am bound to say that this is quite a useful activity. We cannot expect the SEBCC to make executive decisions because the executive decisions are for each of the independent sovereignties. We had a very, very good meeting yesterday on aspects of Dearing, for example, where people exchanged views on what they thought of the Dearing Report, so that is the SEBCC.

6. This morning I was interviewed by some opinion pollster and every question that she asked me was followed by, "Do you think it is satisfactory, successful, quite successful, very successful or completely successful?". If I put the same to you, what would your answer be?

(*Sir John Cadogan*) Oh, I would say that it is extraordinarily successful!

7. Thank you very much indeed. Now just a quick couple of supplementaries. Bearing in mind that my colleagues want to come in with their questions I would be grateful for fairly quick answers; I do not want to take too much of the time. If this other body that I referred to were created—I think Dearing refers to it as a "further body"—would it really be a further body or would it eventually take over from the two existing bodies, would you guess?

(*Sir John Cadogan*) I do not think that I would like to guess, frankly, because I just do not have enough information on which to base it. All that I can give you is my interpretation, my view, of the facts, that you have a Science and Engineering Base Co-ordinating Committee, you have a Council for Science and Technology and Ministers have said that they wish the latter to be a much more open body, indeed, reports have already been published. Now whether in fact the new body will absorb one or the other, I think this really is for discussion. It will be an interesting exercise for those of us involved in the activities of the science base if there were three bodies, it would be a very interesting exercise.

8. It has been suggested by some that a third body, if it existed, should give its advice in private. Can you see any merit in that?

(*Sir John Cadogan*) Government has decided that in fact the Council for Science and Technology should publish its reports, indeed, perhaps Helen Williams could come in on this.

(*Mrs Williams*) Mr Chairman, the Council for Science and Technology was set up as a result of the 1993 White Paper on Science and Technology and it was set up to provide the Government with independent advice on very broad issues of science and technology policy. I think that we set out the remit in the memorandum which you have, so you will understand that it had a very broad remit. The Council for Science and Technology is chaired by the president and the deputy chairman is Sir Robert May, but all the other members are independent, either academics or business people. When the Council for Science and Technology was set up there was a conscious decision taken that it would be more effective in advising Ministers if it did operate in private. There was a perception that the predecessor body, ACOST, published lots of reports with lots of recommendations addressed to Government that had sat on the shelves gathering dust and had perhaps not been as effective as they might have been, so it was felt that if the Council for Science and Technology operated in a paper-less mode with the great and the good from the world of science and business round the table giving advice to Ministers direct, that could be more effective. One outcome of

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that has been the concern that no one knew exactly what was going on in the Council for Science and Technology.

Chairman: Thank you very much indeed, Mrs Williams. Dr Gibson?

Dr Gibson

9. Thank you, Mr Chairman. Do you think that a major disappointment in the Dearing Report is the absence of mechanisms for ensuring that the sum of decisions made by institutions meets national needs?

(*Sir John Cadogan*) Disappointment? Could you elaborate that point?

10. Yes, I mean that the Dearing Report puts up several ideas but it does not tell us how those ideas are going to be achieved as between different organisations and institutions. How do we do that? You have already said that no one knew what some organisation was doing. How do we make sure that that never happens again?

(*Sir John Cadogan*) I think that Dearing had a very large task in a very short period of time. Indeed, this is why the interested departments and Government are now considering the Dearing Report in detail because the question for Government now is to look at these recommendations in the light of what is possible and in the light of what mechanisms could be put in place. I think perhaps that it would be asking too much of Dearing in some instances to set a mechanism because they would not necessarily have sufficient database to know what was happening already.

11. What would your advice to Dearing be then, Sir John?

(*Sir John Cadogan*) I do not think that I would give any advice to Dearing generally, but on particular issues I might perhaps give advice. For example, if you wanted to look into the question of whether or not there should be a large sum available for overheads, one would say, my advice would be to look very carefully into the numbers involved, given time.

12. How much time?

(*Sir John Cadogan*) Tony Quigley is the best person to say so.

(*Mr Quigley*) Mr Chairman, if I may just add something to that. If you actually look at the Dearing recommendations it is generally possible to see who owns a recommendation in terms of being responsible for delivering it. For example, there are a number of questions about multidisciplinary research and the logical place actually to address those is the Science and Engineering Base Co-ordinating Committee because you have the right funding agencies there, research council chief executives and the funding council chief executives, so to that extent it is in fact clear who owns which recommendations and is therefore responsible for implementing them.

13. And do you think that that is the answer to this problem which has been around for some time now?

(*Mr Quigley*) There will always be new problems that will emerge from time to time. There is no perfect way of organising and co-ordinating a system.

14. But how do we pick up on those problems? How do we address them when they happen? Who takes responsibility for them in your opinion?

(*Mr Quigley*) The ones involving the research councils, for example, will clearly belong to the research councils and the ones that clearly belong to the funding councils belong to the funding councils and the ones that straddle the two are typically the problems which will be picked up by the Science and Engineering Base Co-ordinating Committee. If they are bigger, higher level problems, then they would be questions for Council for Science and Technology.

(*Sir John Cadogan*) Mr Chairman, perhaps I may add that the Science and Engineering Base Co-ordinating Committee is not the only way that co-ordination takes place between the various funding bodies. I would not like to say that there was a daily contact, but there is certainly a weekly contact between the research council operation that I head and the funding councils. The very successful Joint Research Equipment Initiative, which was joint between the research councils and the funding councils, came as a result of a bilateral discussion between the Chief Executive of the Funding Council for England and myself and from then on Tony Quigley became involved and the Welsh Office and the Scottish Office and the Northern Ireland Office and out of it came an initiative which went forward in a very short time. I am a member of the Funding Council for England, I am a voting member, and I am an observer for the Welsh Funding Council and Tony Quigley is a member of the Scottish Funding Council Research Committee, so there are interactions all the time. In such a complex poly-funded system, I think that it is tempting in management school style to say, “Can we have an over-arching body to simplify things”, but actually real life is not like that, is it? Real life is a series of interactions with people who have the problem at the time. I think therefore that what we are trying to do is mirror real life without having an overly bureaucratic system.

15. So you do not think that their missions contradict each other at times then?

(*Sir John Cadogan*) I do not think so—it could be, but it has never appeared to be a problem.

16. So who should I ask that question of? Who would know if the missions contradicted each other?

(*Sir John Cadogan*) What, you mean the mission of a funding council vis-à-vis another mission?

17. Yes, the mission of a funding council and the mission of another institution?

(*Sir John Cadogan*) All one can say is that the mission of a funding council is clearly there and the mission of a research council is clearly there. With the case of dual support transfer, then again the funding councils and the research councils know exactly what their respective positions are, so you would have to ask a research council on the one hand and a funding council on the other. I think all that I am saying is that, strange though it may seem, it actually works quite well.

Mr Beard

18. When the research councils were reorganised in 1993 there was a proposition for a standing group of independent experts. Why was that standing group of independent experts never set up?

(*Sir John Cadogan*) Yes, Mr Chairman, I am very happy to go into this in detail, but there is a very detailed answer before your predecessor Committee and, indeed, before the House of Lords Select Committee on two occasions.[1] One has to go back right to the beginning. The White Paper said that the Director General of Research Councils should have at his disposal an expert body to help him give his advice or her advice, the point being that the Director General of Research Councils was to be a single point of advice and the Director General would need an extra group to help him give that advice. Now the Government was moving away from that quite considerably before the first Director General—which happened to be me—was appointed and, indeed, under questioning by the House of Lords Select Committee some six months before the first Director General of Research Councils was appointed the then Minister for Science said that he was having second thoughts about this because already he was being lobbied to make sure that there had to be a representative of this profession, of that subject, there had to be this and there had to be that, were they the right people, did they come enough from Scotland, from Wales and from Northern Ireland, and all of a sudden he saw this becoming a sort of bureaucratic representative body which was not what he wanted. He said: I am already backing off from this, the important thing is that the Director General of Research Councils, whoever he is, should have access to advice. The way that it worked—and this has been endorsed by successive Ministers, but that is the rationale—the way that it has worked out is that we have the seven chief executives of the research councils who each sit on a pyramid of advice, and there are enormous pyramids of advice which cover all aspects of science and technology, boards, committees, sub-committees, etcetera, and, of course, these are people who are not just appointed just because they might suit a particular group, but they are in fact very carefully selected. The Nolan procedures now apply: advertisement, selection committees, make sure that you have got the right balance, the right ethnic balance, the right scientific balance and so on, and these people are constantly advising and producing information. This then channels up into the Director General of Research Councils' office. In addition you have the chairmen of the seven research councils and additionally the chairmen and the deputy chairmen of all the Foresight panels, the President and officers of the Royal Society and the president and officers of the Royal Academy of Engineering, plus independent discussions with a large number of vice chancellors and people who work in the field. That therefore constitutes the expert group. Again, the way that it works is that this is an iterative process. The Director General of Research Councils does not sit there, take all this in and then not talk to anybody and produce a piece of paper that goes to Ministers. The whole thing is iterative. Things are tried out on the councils—"Would *this* be a sensible thing to do?", discussion, meetings. This is normally a very busy time of year. For example, this time last year I had had some 40 meetings with these groups over two or three months. It is slightly different this year because we have got the comprehensive spending review. That therefore is the background to it. It is about providing broad help to the Director General of Research Councils rather than having some small select group, which would be extraordinarily difficult to select. Mr Chairman, I should say that I am very glad to go through this again.

Chairman

19. Thank you, Sir John. You have given us the reference, and I am sure that you appreciate the difficulty of new Committees trying to pick up from other Committees.

(*Sir John Cadogan*) Mr Chairman, I quite understand. I just did not want to take too much of your time.

Mr Beard

20. Would the people who are most suitable as chairmen or chief executives of research councils and running those automatically be the best people to advise on policy?

(*Sir John Cadogan*) Well, we are talking not only of policy, but areas of funding, and the chief executives themselves reflect what this very large community of people says. This large community now, since the White Paper, consists not only of academics but, of course, of users also; we have 50 per cent users. In the Engineering and Physical Sciences Research Council, for example, they have this system of technical opportunities panel (TOP) with a scientific users panel (UP) and they view a sector of British science such as materials, say, and they will look at it from the point of view of the user and from the point of view of the scientific opportunities, and this will all be distilled in, and they will take a great deal of time with this and they will take a lot of evidence. I cannot think of any way better to produce policy, and this will be directed up to the councils. We (OST) sit on the councils and we see what is going on. The councils give their view and this comes up to me, it is condensed and then it is pushed forward. I cannot think of anyone better to do it. The chief executive is a conduit for policy so produced.

21. Is there a danger in that case that the discussion becomes dominated by the administration and funding of science rather than science?

(*Sir John Cadogan*) Oh, no, no, no, Sir. The pyramid of advice that I am referring to is not a pyramid of officials; it is a pyramid of active scientists and users of science. The administrators just service the committees. When TOP and UP decide, shall we say, that more money should go into a particular area of science, it is nothing to do with officials; it is entirely the users and the practitioners, entirely.

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[1] *Reference:* Science and Technology Committee, Minutes of Evidence, The Role of the Director General of the Research Councils, 24 January 1996.

[**Mr Beard** *Cont*]

22. Yes, I know, but they are representing councils that are primarily the funding bodies, are they not?

(*Sir John Cadogan*) The research council is only a mechanism for dishing the money out, and I can assure you that the chairmen and the members of the councils and the members of the boards are certainly very independent people, very independent, and they are not selected by me.

Dr Turner

23. Sir John, I do not have to tell you that overheads have been a sore point in the funding game for many years, so do you agree with Dearing's proposition that the research councils should be meeting the full costs of the research supported by their grants, whatever those costs may be, and do you agree with Dearing's estimate that a realistic figure is about £110 million per annum?

(*Sir John Cadogan*) Let us be clear what we are talking about here. The research councils as part of the dual support system have in the past provided money for research and, indeed, what is considered to be a proper overhead. This used to run to 40 per cent of the direct staff costs in a grant. Whether, indeed, this is the right number or the wrong number is neither here or there. Money was provided for this. After an analysis of this so-called overhead component which I asked for when I came into office, it was decided that this should go up to 45 per cent: it was actually readjusted technically up to 46 per cent in the past few weeks, and that 46 per cent undoubtedly was quite sufficient to cover the costs providing that the other side of the dual support had kept up to speed, but in recent years, the last couple of years, there is no doubt about it, the other side of the dual support system did lag a bit. Therefore, this has led to a so-called funding gap, but as far as the research councils are concerned they have been putting in what they should be putting in. So now Dearing comes along quite properly and says, well, there seems to me to be a gap here, and their estimate of that gap is £110 million, as I recall it. It may be £110 million, it may be more or it may be less; it is actually quite a difficult figure to get at, but this is what Ministers across the piece will have to look at. Indeed, it would be excellent if that £110 million became available so that this could go in to help the Science Base. The question is, how do you do it and where does it come from. I should tell you that one proposal was to take it from the funding councils and transfer it to the research councils. Another proposal was that the research councils should somehow or other hand it over with the grants to the universities or, indeed, that there should be new money to pay for it. A fall back position seemed to be suggested about the £110 million that at the end of the day if no new money came in perhaps the best thing would be for the research councils just to pay the £110 million. This is the difficult thing that Ministers will have to grapple with because the facts are that although the science budget which goes in through the Office of Science and Technology is £1.3 billion, only about £120 million becomes available every year for recycling. Now this may seem strange at first, £1.3 billion, a three year grant, why is there not a third of it? The answer, of course, is that the research grants are given over quite a long period of time, three years certainly, sometimes four, sometimes five years. We have fixed costs like the commitments to ESA and CERN, so what it amounts to is that the actual cash that becomes available every year is about £120 million. Therefore, if indeed you were contemplating saying, well, the research councils should find another £110 million and put it into overhead costs and move into the universities that way, then if it was all done at once, you could work it out for yourselves. There would be no new research studentships for a whole year, there would be no grants whatsoever for a whole year and, indeed, it would not be much better in the second year or in the third year until you would eventually get to a steady state with another 25 per cent reduction in volume. This money, of course, would then go in, but please be aware that the way the overhead money is used when it gets into the universities is that it is not necessarily allocated to that particular piece of research; it goes into the vice chancellor's budget and he or she can spend it as he or she sees fit. The vice chancellors, of course, are again under financial pressure because more and more money is coming in from all over the place, it is coming in from the EU, it is coming in from charities, it is coming in from industry and so on. Indeed, in some of those cases there is perhaps a shortfall of overhead funding and this in turn puts pressure on those who do pay overheads like the research councils. Those are the difficult facts therefore that Ministers will have to take into account when they make a decision at the forthcoming comprehensive spending review, so I do not have a view on it, I just point out what the facts are.

24. Yes, but clearly it would seem reasonable to suggest that whatever the figure is, wherever it comes from, if there is not new money injected into the system it scarcely matters whether it is taken from the funding councils and is given to you or whether you stump up more money, because unless more money is put into the system the total infrastructure is still going to be no more or less than it is already, and, as I understand it, if you have to find the £110 million, then it would be at the detriment of your other funding activity?

(*Sir John Cadogan*) It will mean, for example, no new studentships and no new grants for that year. That is what it would mean if it was done that way. That is all that I can say. It is for others for judge whether that would be a good thing or whether it would be a bad thing.

25. Is it fair to say though that the only real answer is new money, whether it is given to you to distribute along with grants or whether it is passed over through the funding bodies?

(*Sir John Cadogan*) That is another answer.

26. But without new money you cannot really crack the problem, you only shift it about?

(*Sir John Cadogan*) Yes, that is correct, it will be a consequence if you take the £110 million out of the Science Budget, as you say, that is quite right, that is a fact and that is the problem.

Dr Williams

27. With regard to the £110 million, is it fairly uniformly a shortfall across all universities or is it an indirect effect of the research assessment exercise where monies are being taken away from some departments so that some departments come out well and are all right but then there are the ones that in a sense have been overlooked; is it that kind of shortfall?

(*Sir John Cadogan*) I think that Tony Quigley has probably got a very good answer here. What I wanted to point out was that the so-called shortfall, whatever that shortfall number is, one does not know quite where it falls because the money that comes in from research councils does not necessarily go to that research project, so it is an integrated figure.

(*Mr Quigley*) Mr Chairman, the simple answer is that at the moment the research councils pay full direct costs and 46 per cent as a contribution to overheads, bearing in mind the other half of the system. The proposal would mean that the research councils would instead pay the full cost of overheads and the figure that was worked out for that was 110 per cent.

(*Sir John Cadogan*) No, £110 million, not 110 per cent.

(*Mr Quigley*) Yes, £110 million. We suspect that that is probably the wrong number but, as Sir John has said, it is actually a very difficult amount to get a handle on and obviously we are trying to get a handle on it. If there is no new money, because that is really your question, then the Government is actually faced with a trade-off between sorting out overheads and research volume. If the total hit, if I may put it that way, fell on the research councils and they had to pay for overheads without new money and therefore had to consume their own smoke, so to speak, then the net reduction in volume is about 25 per cent at a steady state which means 25 per cent fewer researches, that is actually what it comes to. The trade-off that one has in those circumstances is 25 per cent fewer researches at one end and the effect on infrastructure at the other, and somehow or other one has to get a sensible balance, a good and proper balance, and it is not easy.

(*Sir John Cadogan*) To put the numbers in perspective, Mr Chairman, the actual amount that goes over in overhead support at the moment is £100 million so we would be going up to some £210 million.

Chairman

28. So the 110 per cent, which was a Freudian slip here, was very close to right, was it not?

(*Sir John Cadogan*) Pretty close, yes!

(*Mr Quigley*) We have to be very careful as to what 100 per cent means.

Chairman: It was a slip, but it was very close to the truth.

Dr Kumar

29. Mr Chairman, if I may just follow up on the question of the funding of full costs; do you think that it would provide a powerful incentive to universities to understand their costs properly, and do you have any evidence to back up that this is not the case at present?

(*Sir John Cadogan*) If, indeed, we did get to the situation that some £200 million was going in addition to the research grant into the universities, there is no doubt about it that there would have to be most careful analysis of what those costs were being used for, it is such a large sum of money. Therefore, there would have to be much, much greater transparency by the universities than there is now, very much greater. I do not know where it goes now, except that it goes into the universities. I have written to many university vice chancellors and said, what do you do with it now, and they all deal with it in a very proper fashion. Some of them put it into the department, some of them keep some of it back and charge the department for central facilities and others do other things. They all behave in different ways; they are all autonomous institutes, you see, with their own charters. I do not think that we could go ahead with a sum of £200 million out of £1.3 billion, which is a big percentage, without having real transparency and some sort of uniformity of those costs, so the vice chancellors I think at the end of the day inevitably would have to accept more control from outside. But, most important of all of this, where is the money to come from?

Mr Jones

30. Several of Dearing's proposals regarding research funding rest on the willingness of industry and research charities to provide funds. Given the largely negative response from research charities and companies to Dearing's proposals regarding further contributions from them to an infrastructure loans fund and an industrial partnership development fund, what is the likelihood of such schemes proving feasible?

(*Sir John Cadogan*) Well, I really do not have a view on that. All that I can say is that so far two key bodies have said that they would not put cash in, and I think we just have to look at that, the CIA and the ABPI I think were two. They come from areas which traditionally have been very supportive. Generally—and I speak as an ex-industrialist here—industry is very, very well prepared to put research money into universities. Indeed, of the £6.8 billion which is spent by industry and charities, I think, as well in Great Britain as a whole, something like £580 million actually ends up in universities. That is quite a high proportion of the outside money, and there is great evidence that our industry particularly is well connected with universities. There is no reluctance to support: the joint research equipment exercise was an extraordinary success. There were a lot of people who felt, oh, this is terrible, nobody will go for it, but it was well subscribed. As you will recall, this was a scheme whereby university researchers were invited to bid for scientific equipment on the basis of a science case and the entry ticket was that they had to have a partner who would meet at least half the costs,

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and this was not to say that the work had to be work which was of interest to a particular industry; it was rather a question of whether the industry was interested in using the machine. Certainly it was a scheme that I operated when I was in industry. An example was that one of our laboratories wanted to buy a big spectrometer and I could not justify it on the proposed use of the thing. I knew that a neighbouring university had people there and an outdated spectrometer so the deal that we did was: well, we will buy the spectrometer, put it in your university, you staff it for us and we get 27 per cent of the time. That is the sort of deal. The Joint Research Equipment Initiative raised £50 million on the first round, there were 170 awards, and the second round is well oversubscribed, so industry is quite prepared to put money in, but they will only put it in if they can metaphorically have their logo on and see what they are getting for their money. After all, they have their shareholders to look after. That is the history. As to whether things will change, your guess is as good as mine.

Chairman

31. If I may just come in here for a moment, Sir John, you have said that industry makes a sizeable contribution already—I think we recognise that—but the question is, of course, will industry be prepared to make a bigger contribution, and it could well be because it already makes a sizeable contribution that the answer is, no, it will not go much bigger?

(*Sir John Cadogan*) Again that is for people to judge, Mr Chairman. I cannot judge that.

32. Yes, but the chance is two out of two at the moment that they will not?

(*Sir John Cadogan*) Well, I cannot judge that, I think that is all that I am saying. All that one can look at is experimental evidence.

33. The experimental evidence at the moment is that it will not.

(*Mrs Williams*) Mr Chairman, I think experience is that industry would be prepared to put more money in if there were government funding available on a partnership basis and there is a range of government schemes to encourage research generation between business and university—the LINK scheme is perhaps the biggest scheme—and then there have been particular schemes like the Foresight Challenge and the Foresight Link awards. Now our experience is that there is no shortage of industrial money to go into specific LINK or other collaborative programmes and projects in which they have an interest.

(*Sir John Cadogan*) Which was my point, that they will have a lower interest in it unless they are involved.

(*Mrs Williams*) Some indication of the sort of potential for industrial contributions out there is given by the Foresight Challenge, 1996, for which there was £30 million of government money available which actually levered in at the end of the day over £60 million of private sector funds and at the initial outline bid stage we had, I think, 550 bids which represented at least a notional private sector commitment of half a billion pounds.

Chairman: Thank you very much. Mr Beard has a question before we come back to Mr Jones.

Mr Beard

34. Just on the same point, Mr Chairman, the cases that you are quoting are where industry is putting money into specific projects that they may have an interest in, but that is not what is proposed in the Dearing Report, in either the rolling fund or the partnership. It is not because they are going to be general pools of money over which industry will have no say in respect of the disbursement that they are highly unlikely to work?

(*Sir John Cadogan*) Well, that is a view, yes. Experimental evidence is that that is what is likely.

Chairman: I am afraid that we have only ten minutes left as we are doing a twin evidence session this afternoon, as you know, so we are going to try to go through the next few questions just as quickly as we possibly can and see how far we can manage to get down our agenda.

Mr Jones

35. Mr Chairman, I wonder whether Sir John believes that the Government could be a significant contributor to the proposed revolving infrastructure loans fund if accounting rules regarding the public spending borrowing requirement were changed. Also, is the Office of Science and Technology prepared to take this point up with Her Majesty's Treasury?

(*Sir John Cadogan*) Mr Chairman, I think that Helen Williams is the best one to talk about that.

Chairman

36. Mrs Williams, is there a need for a change in Treasury rules as far as PSBR is concerned in revolving infrastructure loans?

(*Mrs Williams*) Mr Chairman, I am sorry, but I do not think that I am briefed to answer that particular question this afternoon.

Chairman: May we then ask our clerk to give you a written note of the question and perhaps you would be kind enough to write back to the Committee. That is probably the most efficient way of proceeding on this point. Thank you very much.

Dr Williams

37. I just wanted to ask one more question on the industry connection, Mr Chairman. You mentioned earlier that something like £500 million comes from industry into higher education. The briefing that was prepared by our clerk I was going to quote to you anyway, and it quotes a figure from industry to higher education research as £157 million with a total budget to industry of £7.5 billion. That is very close to the order of 5 per cent of the total funds. How does industry's contribution to university research in Britain compare with, say, Germany and Japan and

[**Dr Williams** *Cont*]
our competitor countries? In Germany and Japan I understand universities' links with the private sector are very much stronger.

(*Sir John Cadogan*) It is very difficult to get hard data on what industry is putting into universities in Japan and Germany. It really is quite difficult to get that data. What we can do for you—and I cannot give you that data now—is that I will look out exactly what we have got and put a probability on it. All that I can say from my experience, and at one time I was operating quite the largest university-industry joint research scheme in the country and, indeed, in western Europe, is that it was far easier to get connections in the British universities than even the American universities, and certainly the German and French universities. That is from my own experience, and we were the biggest player. However, that is just one piece of anecdotal evidence. We can come back to you on this. I think that what I am saying at the moment is that I am certainly not of the view that the connections between British industry and British universities lag behind. I am certainly not of that view. In fact, I was at a meeting of the European Industrial Research Managers Association not so long ago where a speaker from Daimler Benz said from the floor that they had done an investigation of connections between universities and industry and that there was no doubt about it that Britain was way ahead of the rest. We are also way ahead of the rest in connecting with foreign businesses too.

Dr Gibson

38. How was that measured, Sir John?

(*Sir John Cadogan*) Oh, it was measured in cash and contracts.

Dr Williams

39. Can I just ask you, charities, industry, the Government, if there is no transfer from the HEFC, where does that leave universities? Is the *status quo* an option?

(*Sir John Cadogan*) I am sorry to say that the pressures which are on Ministers are largely because the *status quo* in science is really never an option. This is a scientific fact of life because, of course, scientific equipment advances at such a colossal rate and discoveries occur and new equipment comes in and then you are without it. We are certainly at the very frontier in molecular/biomolecular science in this country, and to be in business, for example, one needs, for example, a very, very high field magnetic resonance spectrometer. Now, the point is, ten years ago one could have managed quite nicely with a 220 megahertz spectrometer and then, almost overnight, there was a technology breakthrough which allowed a 750 megahertz spectrometer to come in. What it is difficult sometimes for people to understand is that you are then out of business if you do not have that instrument, and there are step jumps, you see. You cannot go on using your old car if you are going to stay in the race, so this sort of step jump is constantly coming along. At the same time greater efficiencies, and information technology helps, but I do not think that science has ever had a status quo situation, and that is why there is always increasing pressure.

Mrs Spelman

40. What would be the longer term effects of the erosion of infrastructure on universities' capacity to maintain research excellence, for instance, if industry places a significant proportion of its research funding abroad?

(*Sir John Cadogan*) If you are saying, what happens if the funding falls away, of course, that would be a disaster, naturally, but I do not think that anyone is suggesting that.

Chairman

41. But if there was a decline in infrastructure in the universities due to the funding falling away, what effect would that have on research excellence?

(*Sir John Cadogan*) Mr Chairman, research excellence is not something that is spread around thinly like butter on bread. Research excellence is located in places of excellence, and excellent places have a great record of getting support. As we move from 20 or 30 front line universities to 50 universities to 115 universities, you cannot expect to maintain a standard of excellence right across the piece there in all of those universities, so there will be a concentration, selectivity, in fact.

42. There was a question that I was going to ask later about selectivity, Sir John, but if there was an erosion of infrastructure, is it possible that that erosion would be done in a selective manner to try to keep the excellence in the places on the bread where the butter is?

(*Sir John Cadogan*) Mr Chairman, I can speak only for the research councils with authority, and the research councils are based entirely on excellence and relevance. I should say that no matter how relevant the work is, it has got to be excellent, and that is the only criterion.

43. But you are not funding the infrastructure, are you?

(*Sir John Cadogan*) Well, it depends what you mean by infrastructure. Research councils do not fund a lot of buildings—although they do fund some buildings; they certainly fund technical support which I regard as a vital part of infrastructure, and they certainly fund front line equipment on a case by case basis, so they certainly fund that.

Dr Gibson

44. Has your percentage in technical support gone up or down in the last five years, Sir John?

(*Sir John Cadogan*) Oh, it is about the same as far as I can judge.

Chairman: While we are on selectivity, Sir John—and we are now coming to our last group of questions—the questions that I should like to have answered are the question by Mr Beard and then the question by Dr Gibson. I think that that is as far as we are going to get today.

Mr Beard

45. The Dearing Report, of course, makes a proper distinction between research and scholarship. The question is really, how may the research assessment exercise help as between these two?

(*Sir John Cadogan*) Well, I feel that it is a bit of a play on words, quite frankly. I cannot accept that the sort of work that John Walker has been doing over the last ten years, which has led to a Nobel prize, the second Nobel prize in chemistry two years running, can be in anything other than the category of scholarship as well as research. It is a real piece of scholarship. To work out why this enzyme worked is one of the great intellectual achievements of humankind, and that is what scholarship is, so I personally have a difficulty with this. I suppose it could be argued that if you were thinking of the fundamental discovery-led science on the one hand, then that could be seen to be different from writing a very scholarly critique of what happened in the Napoleonic wars. I would say that the latter is certainly scholarship, but the former is not necessarily not. I think that is probably what they meant, don't you?

46. Just while we are talking about the research assessment exercise, it is also suggested in various places that this is not conducive to multidisciplinary working, that is, the research assessment exercise. Is that true in your experience?

(*Sir John Cadogan*) No, it is not true in my experience. I am glad that you used the word multidisciplinary rather than the word interdisciplinary because some of the work that we are talking about does bring in a lot of disciplines, and to bring in a lot of disciplines to tackle a big project like the Walker project on the function of ATP, you have to have your fundamental disciplines there, so you must not throw babies out with the bathwater by not supporting these. Now there are mechanisms in the research assessment exercise—the research assessment exercise is constantly being looked at—for allowing for people who publish in an area which is not necessarily straight down the line in chemistry, straight down the line in physics or straight down the line in maths, but also there are allowances made for giving credit for publications which are between universities. Whether, indeed, it is the right weighting it is not for me to say.

Chairman: Thank you, Sir John. Now we have the final question, Dr Gibson.

Dr Gibson

47. So you would really welcome some change in the research assessment where people have to have their formal papers and they are based on a bureaucratic, individualistic appraisal of their work, and departments reckon that if they do not reach certain numbers they will not get funding? Do you not think that those things really need changing because it seems to go against what you said about Walker? It means that Watson and Crick would never have passed the test, would they?

(*Sir John Cadogan*) With respect, Mr Chairman, I cannot quite see how you extrapolate from what I said to saying that. The research councils would fund excellent work wherever it comes from. They have no barrier. It does not have to come from a five star department. There is no research assessment exercise imprint on the assessment by research councils, only to the extent that if a good piece of work comes in, if an outstanding piece of work comes in, and it is good and it should be funded, then they probably will look at it and say: well, is this research worker asking for something that is unreasonable in the light of the equipment he has got in his infrastructure. Therefore, the research council says: "we do not care where it comes from".

48. So a grade 2 department, it would not matter?

(*Sir John Cadogan*) Oh, certainly not, no, no, they are not bad at all. This is something that we discuss very fully in my regular meetings with the chief executives.

49. But that person might not have technical support and might not have that infrastructure and overhead support that is necessary for them: secretarial support, technical support, their equipment maintained and all the rest of it, so Walker would not have survived if there had not been lots of money from other sources coming into a very prestigious department?

(*Sir John Cadogan*) Walker survived because he was working in a research council institute which has been very, very well supported because it is an excellent place. It has been done on the basis of that.

Dr Gibson: Lucky old Walker then!

Chairman: We will allow the very last question to be asked by Lynne Jones.

Dr Jones

50. As you know, Sir John, there are many alpha rated projects which are not funded by the research councils. If you were faced with two alpha rated projects, one of which was from a department that had the infrastructure and therefore would not require additional resources for equipment, and one of which clearly to be successful would require that additional infrastructure, which would get the money, do you think?

(*Sir John Cadogan*) I am very glad to say that that is a problem that has never come across my desk. Much as I would like to make those sorts of decisions, the one thing that the Director General of Research Councils cannot do is express any view whatsoever on any individual research programme. I am not ducking the question actually, because it is quite important. That would be done by people who are very close to the cutting edge, and whether, indeed, such a case ever occurs, I would not like to say. Clearly, if there is no infrastructure then it would be an improper use of public funds to award a grant there. I suggest that what would happen is that he would be encouraged to go somewhere else.

Chairman

51. There are times, Sir John, when the questions even if they do not get answers are worth putting because they indicate a danger that might exist or a mind set that could be prevalent or, indeed, they might indicate, as this one does, that we should not

[**Chairman** *Cont*]

ignore some very top-rated research projects simply because of, up until that time, an infrastructure deficiency. I think that we could debate that for a long time, and maybe we shall on another occasion. We have now run out of time. May I thank you, Sir John, for being our first witness in this new Committee and may I also thank your colleagues, Mrs Williams and Mr Quigley, for coming along with you. Thank you all for so ably helping us this afternoon.

(*Sir John Cadogan*) Thank you very much, Mr Chairman.

Memorandum submitted by the Save British Science Society (SBS)

INTRODUCTION

1. The Committee has received copies of the SBS response to the Dearing Report, "SBS Memorandum to the Secretary of State for Education and Employment[1]".

2. On Saturday 11 October, after the Memorandum was written, SBS brought together a multi-disciplinary group of senior academics (see Annex) to meet John Battle MP, Minister of State for Science, Energy and Industry.

3. A few key points from the meeting:

- creative,"seed-corn" research is done by individuals, not committees;
- "management" of academic research means identifying and supporting original minds, as individuals and groups, wherever they are;
- dual support, an "invention of genius" crucial to the brilliance of UK research, has collapsed;
- true partnerships with industry in the progress of research are welcomed, but an overall balance must be ensured in which scope for seed-corn research is not increasingly narrowed;
- Technology Foresight is very relevant to technology and development—it is not "Science Foresight"; and
- Britain's scientists and engineers are an unrivalled asset at the start of a century in which modern economies will be driven by science-based industry and commerce—but the asset will be wasted if denied internationally competitive levels of investment.

4. Some of the comments made below, in response to the Committee's questions, are based on views expressed at the 11 October meeting.

ADVISORY COUNCIL ON NATIONAL RESEARCH POLICY (ACNRP)

5. SBS agrees with the Dearing Report's doubts about the current arrangements for the presentation of independent advice to government on science and technology policy.

6. Council for Science and Technology (CST). The function and remit of this body is not clear. CST members have expressed doubts about its value; the Council is not consulted on major items of policy—such as the implications for science in government of the move of the Office of Science and Technology (OST) from the Cabinet Office to the Department of Trade and Industry (DTI) in 1995.

7. In the White Paper of 1993, which established the CST in place of the Advisory Council on Science and Technology (ACOST), it is stated that "information generated" by the CST "will normally" be published but only one such event (Evidence to "Dearing") has occurred in four years. The CST appears to have been singularly inactive, compared to its predecessor.

8. The Research Councils. The re-organisation of the Research Councils (RCs) in 1993 was accompanied by the replacement of the Advisory Board for the Research Councils (ABRC) by a Director General of the Research Councils (DGRC) who was to be advised by a "small *standing* group of independent experts" (our italics). This group has not been set up. The widespread perception in the community (expressed also on 11 October) and within the RCs is that the RCs have become a "fiefdom" of the DGRC with too much intervention on programmes and a lack of open review of the operation of the RC sector as a whole.

9. The Coordinating Committee for the Science and Engineering Base (CCSEB). The coordination of policy in support of science in the universities between the RCs and the Department of Education (through the Higher Education Funding Councils (HEFCs) and their predecessors) has often been poor (even when both were in the same Department). Under the CCSEB matters seem no better. The destructive cut in capital

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[1] Not printed.

funding for the universities imposed in the 1995 budget (30 per cent in the first year, rising to 50 per cent in three years) was made by the DfEE in full knowledge of the devastation it would cause. As a senior scientist put it on 11 October: "*If government wanted to do the most damage to university science in one act, this was it.*"

10. SBS supports the Dearing Committee recommendation for the formation of an ACNRP with the following qualifications:

- The Council should be chaired by the Prime Minister[2] or the government's Chief Scientific Adviser (CSA) acting in his place.
- The Council's remit for advice should clearly include coordination of all government funded R&D, covering the Departmental[3] laboratories as well as the RCs and research in the universities.
- Contrary to the Dearing Report, SBS strongly believes that if the Council is to be respected as truly independent its advice must be made public—at least after government has made any decisions. Government should be able and required to defend its policies; Parliament, scientists and the public need to understand the basis on which decisions are taken.

Research Assessment Exercise (RAE), Teaching and Research

11. The fact that "assessment" of teaching and research is being performed should not be taken to mean that satisfactory measures of quality and performance exist—they don't. All one can hope for is a "least bad" system, modulated by sound judgement.

12. Acting through the HEFCs the DfEE has a long term "duty of care" for research in the universities, the core of the UK science and engineering base. This responsibility does not get enough weight in the present, highly formulaic approach to the assessment and allocation of resources. In particular the present RAE system:

- encourages uniformity where there should be diversity;
- leads universities to compete when collaboration should be encouraged;
- induces universities to make moves driven by "playing the ratings game" rather than long term policy;
- threatens the prospects for outstanding groups or individuals in an otherwise undistinguished Department; and
- can lead to the extinction of a core teaching subject.

13. The RAE must be simplified, become less of an administrative drain on time and energy, be less formulaic and give more weight to sound judgements made with the participation of independent experts from overseas.

14. At university, students are best taught in Departments where research—basic, strategic, applied or development—is also carried on; not necessarily by all teaching staff, although preferably they will have been in research at some point in their careers. In a system of about 100 universities not all Departments can be active in the same way, all cannot and should not aim to emulate the main "research universities".

15. The RAE system must be altered to encourage a broad diversity in the missions of our university Departments. Activities closer to the applied end of the spectrum and collaboration with other local institutions including industry and SMEs should receive credit. But this also requires additional sources of funds, it cannot be financed at the further expense of the basic end of the research spectrum (see also § 32).

IT Systems Access

16. Electronic communication via SuperJANET and its successors is an essential tool of research, allowing the transfer and exchange of information and facilitating collaboration between institutions, both nationally and internationally.

17. The present serious overloading of international network traffic requires investment in such facilities as local "caches", and provision of increased international bandwidth. SBS supports the Dearing recommendation for a report from the Joint Information Systems Committee by next year.

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[2] As is the case for the President's Council of Advisers on Science and Techology in the USA.

[3] A situation in which a Department can withhold important data from university experts, as in the BSE case, is indefensible.

EQUIPMENT AND INFRASTRUCTURE

18. The quote (§ 9) already taken from the discussion on 11 October indicates the depth of the crisis in the universities, affecting both research and teaching. Speakers from all disciplines emphasized strongly the *urgency* of the situation; as one put it *"the situation is acute, opportunities are being lost, solutions in a year or two will be too late."*

19. The Dearing proposals for the generation of a revolving loan fund neither meet the urgency of the need nor, in calling for matching funds from industry and the charities, are they plausible. Industry in the UK already funds 6 per cent of academic research, as high a proportion as in other countries, and is unwilling to contribute to a general fund rather than specific projects of direct interest. Tax-breaks for gifts of equipment to universities, as in the USA, could help but would not come near meeting the immediate needs.

20. The PREST surveys show a combined teaching and research deficit now reaching £1 billion. The responsibility for this situation lies with government—through the continuous attrition of the unit of resource over more than a decade followed by the 1995 raid on capital[4]—and it is only government that can repair it.

DUAL SUPPORT, THE RCs AND HEFCs

21. The "Dual Support" mechanism was intended to provide a necessary degree of plurality in the funding of academic research, to foster diversity and support originality and excellence wherever it could be found. It has been very successful.

22. In principle the two funding channels are complementary and independent: the RCs allocate funds for research on the basis of a judgement, usually involving peer review, of the value and feasibility of research proposed to be done; the HEFCs make their allocation on the basis of a retrospective evaluation of performance and leave the disposition of the funds to *local management of research.*

23. The inherent stability of HEFC funding is essential to effective management of local resources and the progress of long term basic research in the universities. It must be adequate enough to allow *the taking of risks in research*, without which the "seed corn" will not see the light of day.

24. But Dual Support has collapsed:

- the "well found" laboratory no longer exists (see above) except where provided by an outside contract for specific research[5];
- the R-allocation from the HEFCs is more than consumed in covering the unpaid indirect costs of research "funded" by the Research Councils, charities and industry[6] and the upward spiralling costs of bureaucracy and administration; and
- by way of illustration, at the 11 October meeting it was said that all but two physics Departments are in deficit—by as much as £1 million.

25. There is *no money available* for local university management to use at its "discretion" to fund long term, basic research "in accordance with the principles of academic freedom and institutional autonomy", in the words still used by government today[7], and there has not been for some years. Dual support is now a myth.

26. The damage is the greater as, following the 1993 White Paper, the RCs have become increasingly prescriptive in their approach to funding of academic research. As a speaker on 11 October said: *"Now one goes to the Research Councils to do what you can get money for, not for what you want to do."*

27. The disappearance of local funds is particularly damaging to the promotion of bright, original young researchers of high potential yet to make their mark in the wider world. They must be given opportunities at an early stage, and local management is best at identifying them and setting them on their way.

28. Unfortunately, the consequences of the collapse of Dual Support for the quality of the UK science and engineering base will not be evident for some ten or more years. It will then be too late to repair.

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[4] It must also be noted that the costs of front-line equipment, needed in research and teaching, rise faster than the general price index (PREST).

[5] A Charity Director has remarked that where the charity has equipped a laboratory it becomes like "an oasis in the desert."

[6] There is a compulsion to seek industrial partners, for ROPAs and other schemes, to obtain industrial contributions to equipment costs etc.

[7] See Government response to House of Lords Select Committee report on "The Innovation-Exploitation Barrier" October 1997.

Collaboration and Sharing

29. SBS strongly supports incentives which would encourage inter-Departmental and inter-institutional collaboration and sharing of facilities. Successful examples were quoted at the 11 October meeting, and those present showed a readiness to build effective collaborations. But the working of the RAE exercise—throwing institutions and Departments into competition—was held to be an unfortunate impediment to establishing collaborations.

Industrial Partnership Development Fund

30. SBS supports this idea of Dearing which recognizes the value of links between university researchers and small businesses, and can also be a way of encouraging and supporting research and development activities by teaching staff in institutions or Departments not receiving research funding from the HEFCs.

31. This should go together with the suggestion for the establishment of an equity fund to assist the development of new businesses and the formation of university-linked incubator units.

32. *New additional sources of public funds are essential for such initiatives.* The appropriate source is the DTI, which has reduced annual expenditure at the interface between research and its application, in the "development gap", by almost £1 billion over the past few years.

October 1997

Annex

PARTICIPANTS IN MEETING WITH JOHN BATTLE MP MINISTER OF STATE FOR SCIENCE, ENERGY AND INDUSTRY

Saturday, 11 October 1997, University of Leeds

Participants

Professor Mike Bode	Head of Astrophysics, John Moores Liverpool
Professor Geoffrey Boulton FRS	Dean of Science and Engineering, Earth Sciences, Edinburgh
Professor Richard Flavell	Director, John Innes Centre, Biology, East Anglia
Professor Peter Goodhew	Dean of Faculty, Materials and Engineering, Liverpool
Professor Peter Heggs	Chemical Engineering, UMIST, Manchester
Professor Oliver James	Head, Department of Medicine, Newcastle
Professor Douglas Kell	Biosciences, Aberystwyth
Professor David King FRS	Head, Department of Chemistry, Cambridge
Professor Sir Harry Kroto FRS	Chemistry, Sussex
Professor Tony May	Pro-Vice-Chancellor, Research, Leeds
Professor Jacqueline McGlade	Biological Sciences, Warwick
Professor Paul Nurse FRS	Director General, Imperial Cancer Research Fund, London
Professor Ole Petersen	Head, Department of Physiology, Liverpool
Professor Chris Robson	Chairman, School of Mathematics, Leeds
Professor Mike Springford	Head, Department of Physics, Bristol
Professor Tony Trinci	Dean, Biological Sciences, Manchester

SBS Executive Committee

Professor Richard Joyner	Chairman, SBS, Director of Research, Nottingham Trent
Professor Jean-Patrick Connerade	Physics, Imperial College, London
Dr Matthew Freeman	MRC Laboratory of Molecular Biology, Cambridge
Professor Luke Georghiou	Director, PREST, Manchester
Professor Hugh Griffiths FEng.	Electrical Engineering, UCL, London
Dr John Mulvey	(Physics), SBS
Professor Denis Noble FRS	Physiology, Oxford
Professor Peter Saunders	Mathematics, Kings College, London

Department of Trade and Industry

Mr Simon Evans
Dr Keith Root

Examination of Witnesses

PROFESSOR RICHARD JOYNER, FRSC, Chairman, Director of Research, Nottingham Trent University, DR JOHN MULVEY, Director, PROFESSOR GEOFFREY BOULTON, FRS, Dean of Science, Department of Geology and Geophysics, Edinburgh University, and PROFESSOR PETER SAUNDERS, Executive Committee, Department of Mathematics, King's College, London, Save British Science Society, were examined.

Chairman

52. Professor Joyner, thank you very much for coming along this afternoon from the Save British Science campaign and bringing with you your colleagues. I wonder whether you would care just to begin with to give just a very brief introduction of your colleagues to us?

(*Professor Joyner*) Certainly, thank you, Mr Chairman. Professor Geoffrey Boulton is the Dean of the Faculty of Science and Engineering at the University of Edinburgh, and he is an earth scientist. Dr John Mulvey is a director of Save British Science Society and before doing that he was a research particle physicist at the University of Oxford. Professor Peter Saunders is a member of the Save British Science Executive Committee and is in the Department of Mathematics, King's College, London.

53. Thank you very much, Professor Joyner. Would you like to make a very limited opening statement about Save British Save and tell us what it is? We do not want too long a statement, but we would very much like to have the scene set, if you can do that for us?

(*Professor Joyner*) Thank you very much, Mr Chairman, yes, certainly. Save British Science was set up just 11 years ago as a response to one of seemingly unending waves of discouragement to British science. Ever since we have been trying to put the case for the support of basic science both from Government and from industry and commerce, and increasingly broadening our interests to take account of the interrelationships within science and engineering on the one hand and science and medicine on the other. We are delighted to have been invited before to give evidence to the predecessor of this Committee, Mr Chairman, and in the House of Lords, and we hope that we can be of help to you in your deliberations on the Dearing Report this afternoon.

54. Thank you very much indeed. In the early days of Save British Science I hope Dr Mulvey will remember the most constructive day that we had in Oxford, I think in about 1984. That was in the very early days, before it had really got off the ground. It is nice to see you again, Dr Mulvey.

(*Dr Mulvey*) I much enjoyed that visit, Mr Chairman.

55. Professor Joyner, we have looked at your submission and you refer to proposals for an independent advisory body. Do you think that would overcome the problems that you mention in connection with the Council for Science and Technology and the Science and Engineering Base Co-ordinating Committee? You refer to the problems in those two bodies and the proposal for an independent advisory body. How would that solve the difficulties?

(*Professor Joyner*) Perhaps I may ask Dr Mulvey to speak to that, Mr Chairman.

(*Dr Mulvey*) Mr Chairman, I think we felt that as part of an independent overview of science and t echnology in Government that there could be, let us say, a sub-group of such a body which could have the responsibility of looking at the relationship between the research councils and the universities in terms of funding of academic research. At the present time it seems generally felt that the co-ordination does not work; the present system does not seem to be very satisfactory, notably as illustrated by the cuts imposed on capital funding in the 1995 budget, where we understand that the problems were pointed out to the Department of Education in the Coordinating Committee but nevertheless the cuts still went ahead and they are still having very damaging effects. Therefore, if there were a higher level body like this body that the Dearing Committee suggested, and if it were clearly part of the responsibility of that higher level body to keep an eye on these problems, one might hope at least that there would be better co-ordination so that when such a difficulty arose it could be taken to a higher level.

56. Do you think, Dr Mulvey, if I may address the question to you, that such a council could take account of research sponsored by other bodies such as industry, charities or even the European Union?

(*Dr Mulvey*) Mr Chairman, I think that it should include that in its overview, in other words, it would be rather odd if it were not; it is described as an advisory council on national research policies, and if you take that seriously, then it should be keeping an eye on all those areas and seeing how the whole thing fitted together. Another aspect of this, as I think we comment, is the whole question of co-ordination of approach to research across Government, not just looking at the research councils and universities, but their relationship with the research programmes of departmental laboratories as well. There again there seems to be a need for that to be brought more clearly into the relationship with the rest of the Science Base. When in another place the President of the Board of Trade was asked whether she had any power as far as expenditures on research and development in the departments were concerned, the point was made that sometimes the department apparently rather arbitrarily may cut its support for research going on in one of the research council laboratories, and that has very serious impact. There are plenty of examples of that. Therefore, as I was about to say, the answer of the President of the Board of Trade, although she has a responsibility, it seems, for co-ordination of policy across Government was that sadly, she said, she is not able to be very effective if other departments decide to cut their budgets. Therefore, in all these respects we felt that there is a role that should be played by an independent body.

[**Chairman** *Cont*]

Chairman: Thank you very much indeed, Dr Mulvey.

Mr Jones

57. Would you agree that a major disappointment in the Dearing Report is the absence of mechanisms for ensuring that the sum of decisions by institutions meets national demands?

(*Professor Joyner*) Would we agree that that was the major deficiency? Perhaps that implies that that deficiency does exist. I am interested if you can tell us a little bit more about how you feel that the institutions are not meeting demands because I think, representing largely the university sector on this side of the table, we would actually feel that we are meeting national demands and doing so, given the resources available to us, rather effectively.

58. We have had debates in the House where this topic has been touched on and there is a feeling, certainly among some colleagues in the House, that the Science Base is doing some wonderful work and maybe it is the fault of the financial institutions that that is not followed through into providing the industrial base for us to have a flourishing balance of payments, for instance. Do you think that there is a co-ordinating body which is actually translating the needs of the country, and then translating that into which projects?

(*Professor Joyner*) I think that there are two concerns there. You have referred to the financial institutions. I could mention perhaps that last February we, with the then Science Minister and the Department of Trade and Industry, organised a symposium to look at the relationship between the financial institutions and the support and the development of research, and I think that there is a general concern that we are perhaps behind competitive countries in the mechanisms that we offer for that. I certainly think that in terms of the relationship between industrial research and academic research Dearing effectively uses the phrase that they did not have time to go into that, or how that should be developed, so I think that there is a concern there. From our standpoint I think that we would also want to echo a concern at the level of support for research within UK industry. Sir John Cadogan referred to a scheme which he ran when he was involved in research at BP. I happened to work for him at BP at that time and it was a magnificent scheme, but sadly it no longer exists because emphasis on research no longer accords with the shareholders' wishes; but also it was always an exception because the situation in the oil and chemical sector is very different from the situation elsewhere. One can perhaps not blame Dearing for not wanting to get into the fine detail of such matters.

Chairman

59. Did you think, Professor Joyner, that the Dearing Report made any mention at all of mechanisms that would help decision making that would help the national need or were you disappointed that it was absent from the Dearing Report?

(*Professor Joyner*) Mr Chairman, I think that the two proposals that he came up with, the revolving equipment fund and matching funds from industry and charities, are both essentially implausible and I think that they have been greeted with very widespread scepticism.

60. So there is a disappointment?

(*Professor Joyner*) I think they would be ideas that really are rather unlikely to happen.

(*Professor Saunders*) Mr Chairman, if I may just make a point on this, there are really two questions. The first is whether the universities are doing those things which they should be doing which would be best in the national interest, whether they are doing the right sort of research and so on, whether they are investigating in the right fields. I have not heard anyone making a case that they are not doing that and that they are going off on flights of fancy and therefore Dearing did not comment on it; he had no need to. The other question is whether what we do in the universities is then properly fastened on by industry and transferred across. There I think that everyone admits that there is a problem, and a serious one, but I rather suspect that Dearing felt that it was not within his remit.

61. That is very clear and very helpful, Professor Saunders, thank you very much. Professor Boulton?

(*Professor Boulton*) When Mr Jones speaks of disappointment that the sum of institutional decisions does not meet the national need, the key questions are: what is the national need and how is it best responded to. My view of the Science Base is that it is there to furnish society with a knowledge base which it might use for a variety of purposes, and one of those is to sustain and develop its industry. There are two very clear models of response. One of them is to say that science is the art of the possible. It is good at providing solutions, though it is not necessarily very good at finding answers to carefully posed problems. Throwing money at problems at a particular era of scientific development simply does not work. The next decade you might suddenly find something new comes on stream and you can solve your problem relatively cheaply. I think that one of our current difficulties is that we are unsure about the extent to which we ought to be stimulating creativity, particularly in young people, the extent to which a bunch of wise old birds—and I happen just to have come from a meeting of wise old birds in a research council who are prescribing the programme for a large sector of UK science funded by a research council for the next five years—are likely to get it more right than the young ones. My view is that we are not likely to. If, however, the science that we fund is a consequence of such serendipity the question is how in heaven's name then do you absorb it within the national industrial base? My view is that the key part of this is a brokering exercise where one attempts to match solutions that the Science Base is good at throwing up with opportunities that the industrial base is good at identifying. In a sense, one might say that that is one of the roles of Foresight. It is not clear to me that the Dearing Committee got as far as defining what it thought university research was for.

[**Chairman** *Cont*]

62. We will have a last answer from Dr Mulvey, and then we must move on. Dr Mulvey?

(*Dr Mulvey*) Mr Chairman, I just wanted to question whether Mr Nigel Jones felt that this was something that Dearing should set up as a structure that would decide what these national needs were and how they should be acheived. As Professor Boulton said, I think that is not what one would expect. I do not think that one can set up such a structure, but beyond a certain point one has to hope that whatever structure you call it industry and the universities and the other people involved in the finance sector learn how to work more effectively together, because you cannot programme these matters centrally.

Dr Kumar

63. In your submission, Professor Joyner, regarding dual support funding you say, "dual support has collapsed". Can you give us some evidence of how it has collapsed to support this view?

(*Professor Joyner*) Thank you, I am glad that you brought this on to dual support because it is something that we believe is one of the most crucial issues that Dearing has addressed and we are very glad that he has argued for the continuance of dual support. When I came into the business of being an academic about 30 years ago, what happened was that most of the research that went on in universities was carried out on funding that came from the then University Grants Commission and the icing on the cake was that provided by the research councils. Now this is backed up by evidence that we had in the meeting that we had with Mr Battle, the Minister, about a month ago. Now, if you are an experimental scientist without research council funding, you can do effectively no research. You have to have research council funding or industrial funding or external funding of some sort in order to carry out effective research at all, and that is really what we mean by the collapse of dual support. Why, one might ask, is this important? It is really important for the sort of reasons that Professor Boulton and, indeed, Professor Saunders were highlighting, that there is really a need for flexibility to recognise and to support good ideas from individuals. All the countries which are successful in research have a plurality of funding mechanisms. We are coming dangerously close to the situation where we have only one funding source, the research councils, and all the empirical evidence from international comparisons is that if you want good basic creative research, then you have a plurality of funding mechanisms, and the one which we invented in this country is the dual support mechanism which has been hitherto enormously successful in a way which is recognised by Dearing and in a way that we believe it is crucial to put back together again so that it is properly resourced, and allowed to return to something approaching its former glories.

(*Dr Mulvey*) Mr Chairman, I think one thing that is maybe forgotten about is the impact of the 40 per cent reduction of unit of resource. It is usually thought that that is something to do with teaching, but in fact it has a tremendous impact on the whole infrastructure and the whole of the support of activities in universities, and that itself has an impact, of course, on the general support for research. In addition, of course, there is the question of the costs of research at the frontiers increasing somewhat faster than inflation. The other thing, and this was brought out, I think, when Coopers and Lybrand made a survey of what were the unpaid indirect costs that we hear so much about, is that the question that arose then was, since these were unpaid, how was the cost indeed met? Part, and I believe a significant part, although it is hard to quantify it, is that the staff are working 60, 70 hours a week and suffer somewhat inadequate salaries. Therefore, in all these ways the situation, the attrition in funding generally, has had this effect accumulatively over the years, and that is what brought us to the feeling expressed vividly in some cases at our meeting in Leeds that collapse is not an unreasonable word.

64. If I may just follow that up, Mr Chairman, and explore it, in your submission you also say that the Department for Education and Employment does not give enough weight to its responsibility for research. Now how can this best be resolved? What can we do about it?

(*Professor Joyner*) I think that we should start out by expressing our serious concerns about some of the current pronouncements that have come out from the Department for Education and Employment about its role in research. They do seem to us to represent a lack of understanding of both the cultural and the economic significance of science and technology. It is difficult to find a precise answer to that because in a sense I suppose they would argue that the responsibility is devolved to the funding councils, and the funding councils are, I think, very well aware of their responsibilities in this area and do the best that they can within the resources that are available to them.

Dr Kumar: You said that certain comments had been made—what comments? Can you tell us what comments?

Chairman

65. I think that Dr Kumar is quoting your own comments, Professor Joyner, from your memorandum. You state in the memorandum that the Department for Education and Employment does not give enough weight. They are your comments, so we want you to substantiate them and then to say what could be done to improve the situation?

(*Professor Joyner*) To substantiate them, I think the key example was the reduction in the equipment budget of about two years ago on the assumption that it could be replaced by the private finance initiative. That is a correct statement in so far as it relates to university halls of residence and activities in universities which are income generating, but it was I think widely recognised as being a complete disaster for the universities as far as laboratory equipment was concerned. As Dearing recognises, that equipment is on the whole a depreciating asset and not a type of investment that can be used to attract private finance initiative, so that was the trigger for our comments, I think. However, there has been recently one of the Ministers in that department who

[Chairman *Cont*]

has said that it really is quite irrelevant how many scientists and engineers this country educates because scientists and engineers are expensive and arts graduates are cheap and therefore we should not be educating more scientists than we need. That to our view does indicate a lack of understanding of both the economic and the cultural importance of science and technology within the United Kingdom. That is a recent pronouncement of about two to three weeks ago which has reinforced the concerns that we have. How do we do something about it? We have asked, Save British Science has asked, consistently for meetings with the Department for Education and Employment to try to discuss these sorts of issues with them. We are consistently told that they are not the responsibility of the Department for Education and Employment but they are the responsibility of the Office of Science and Technology, and that in itself raises and reinforces our concerns.

Dr Jones

66. Could you let the Committee have the details of that particular comment so that when we see the Minister ourselves we can raise the matter?

(*Professor Joyner*) With pleasure, Mr Chairman, yes.

Mr Beard

67. The Dearing Report estimated that there was a deficiency of about £110 million in the sums required properly to fund the research councils' projects. First of all, do you agree with that as an estimate? Secondly, do you believe that those full costs should be taken from the research councils' funds?

(*Professor Joyner*) I think that that estimate is probably as likely as any other to be right. The debate on the full costs of university research has been going on for a very long time now and the figures vary considerably. I think that there are two things that we would like to say about that. Firstly, it represents a very small fraction of the financial problems that Dearing referred to. Dr Mulvey referred to the Coopers and Lybrand report. The Dearing Committee also refers to an estimate of the funding gap in research which goes up as high as £720 million. There is a recent estimate from the Policy Research in Engineering Science and Technology group from the University of Manchester which estimates that the combined teaching and research deficit in the university system is over £1 billion, so the sums of money are in practice of greater significance than the £120 million that is referred to. Our preferred solution is the one that Dearing himself adopts, that this should be provided as new money into the system.

(*Professor Boulton*) Mr Chairman, if I might just add to that, I think that in addition to the indirect costs, direct costs are not being fully funded at the moment. My estimate would be that in many areas direct costs have been underfunded by the order of 30 per cent. This comes from two sources. first of all, people who bid for grants do not bid for the full direct costs;[2] secondly, the research councils frequently—and it is the academic colleagues of those who are bidding—will not fund the grant fully whereas the science is done fully. The consequence is that the direct costs are subsidised from other sources within the university and the overall impact of that is that the universities are effectively involved in a price war. They are undercutting each other in bidding for research contracts. In my view one of the best things that they can do is to set up a cartel and refuse to accept under-funded research. When I see my university or Oxford or University College, London, turning down a major grant, I think we will have won a small victory.

68. Do you believe that the proper arrangement would be that the funding councils should fund all the infrastructure and the indirect costs and therefore leave it to the research councils to fund the direct costs of individual projects? Would that be a proper role for the two organisations?

(*Professor Joyner*) I think the proper role certainly for the research councils is to fund the full costs of the projects. I think that the funding council role goes beyond that. The funding council role goes to providing the local discretion, particularly to support people at the early stages in their career, because one of the consequences of the problems that Professor Boulton has alluded to is that it is increasingly difficult for young people to gain support, and that is support which traditionally has been provided through the funding council arm. Therefore, there are roles for the funding council arm that go well beyond simply the provision of infrastructure that the research councils can then come along and capitalise on.

69. I accept that there is a role beyond that, but would you say that it is the role of the funding council to undertake this basic provision of infrastructure and that research councils should not be doing that but they should be funding the direct costs of individual projects?

(*Professor Joyner*) I think that it probably the only way that the system is actually workable. I would be interested in Professor Saunders' comments on that.

(*Professor Saunders*) I think that it is largely true, Mr Chairman. What can happen is that in the institutions which are very, very successful in attracting research council money then you can find an excess burden being placed on funding council contribution. Therefore, if there is some amount of overhead, I think that is reasonable. I think that what is unreasonable is if it is supposed that the basic infrastructure has to come from the research councils. That must come from the funding council. Nothing else makes any sense if for no other reason than that infrastructure is the sort of thing that has to be provided on a continuing basis and does not work well on one-off grants.

70. So that if the money were not forthcoming you would advocate cutting back on research grants to bring it more into line with the overheads that were there?

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[2] *Note by witness:* The reason for this, we believe, is that academics consider bid for the full direct costs might jeopardize the success of the application.

[**Mr Beard** *Cont*]

(*Professor Saunders*) We are going down a line that is perhaps unprofitable. If there is not enough money, wherever it comes from, then research is going to have to be cut back sooner or later. If I read the question correctly, Mr Chairman, it is a question of whether we push the research council or the funding council, and I do not think that is really getting at the problem. The problem is lack of funding.

(*Dr Mulvey*) Mr Chairman, if I may just add a point on the role in dual support of the funding coming through the funding councils, the point about this is that it should be a sustained, long-term source, it is not just a package made up of a lot of short-term grants. This also means that it is more efficient in the way that management locally can order the use of staff and facilities to support a range of activities—including assistance to teaching. The funding councils should provide stability in funding and they should provide scope for local initiatives in research which can be significant and the funding council should have this role of allowing local management to give a chance to young people to prove themselves.

Dr Gibson

71. I understand then that you do not see any other ways to fund the cost of research in universities other than putting the emphasis on funding councils, is that right? Is that what you are really saying?

(*Professor Joyner*) No, what we are saying with great respect is that the dual support mechanism has worked in the past and it represents by far the best way of providing the excellent oportunity and scope for young people, the creativity that we want to see in the system, and that that involves monies coming from both the funding council and the research councils which have complementary but worthwhile individual roles to play.

72. Let me suggest that another hard-nosed approach to it would be even more selective—your word. We were selective in the 1996 research exercise. Would you agree with that? Do you think we could be more selective and say that only people with grade four and above get anything at all? What do you think of that?

(*Professor Joyner*) Coming from one of the post-1992 universities, quite honestly, I do not think a lot of it, but I will not be partisan about this. Selectivity is recognised as being an inevitable and necessary part of the system, so the principal argument then is what level of selectivity do you have, and that level has I think to achieve at least two things. One, it has to achieve support of excellence. The other is that it has to maintain the flexibility and scope for movement and the scope for development within the system. My own belief—and this is echoed, I know, for example, by the Vice-Chancellor of the University of Wales in Cardiff—is that the present level is roughly correct in that it provides for movement and it has all the things that we want to see happen. In essence if you were to move all of the money that you are talking about from the grade three departments to grade four and five departments, the sum of money involved is well less than 10 per cent of the total sum of money, but you would strike out the possibility for emergence of quite a number of potentially very well worthwhile players in the game. The potential damage of that can be illustrated if you look at what would happen if this had been done in 1965 rather than in 1997 when you would potentially have wiped out—you could have used the same argument to wipe out—Warwick and Sussex and one or two of our preeminent institutions at the present time, so flexibility is important here, but there is a universal acceptance in the system that selectivity is here to stay.

(*Dr Mulvey*) Mr Chairman, I think that one must stress the point that selectivity is already very high in the way in which distribution takes place and, in fact, I believe from some data that I have looked at which is quite contrary to some views that it may be as high here as, if not higher than, in the United States. So let us not make the mistake of assuming that we are very slack about selectivity and therefore if there is a problem, as there is, all right, crank it up a bit more. There is not any more room without doing a lot of damage.

Chairman

73. To the seedcorn, as it were?

(*Dr Mulvey*) Yes, Mr Chairman.

Chairman: Thank you very much, Dr Mulvey. We move on then to research assessment exercise.

Mrs Spelman

74. Do you agree that the research assessment exercises in the United Kingdom are widely seen as world leaders in assessment and promotion of research quality?

(*Professor Joyner*) There are considerable strengths and weaknesses, I think, to the research assessment exercise. There is no doubt that the research assessment exercise has concentrated university managers' attention on taking care of their excellent research in a way that certainly did not happen 20 or 30 years ago. There are a number of down sides of the research assessment exercise. I was surprised at Sir John Cadogan's defence of the research assessment exercise treatment of interdisciplinary and multidisciplinary research because I think that the consensus view is that the research assessment exercise is very bad at that and is very much better at rewarding mainstream research within established disciplines. That is one of the down sides. Another potential down side is that patterns of research will be altered and will have to be altered to play the research assessment exercise game, and that this will have a considerable disadvantage in terms of allowing people long-term oportunities to develop their ideas. Some of you will have seen the television programme on the man who solved the mathematical puzzle shown last June. This is a Princeton mathematician who basically spent seven years thinking about it and came forward with an advance of earthshaking importance in mathematics. The research assessment exercise would close him down. That is perhaps an extreme case, but it does illustrate that there are some problems with the research assessment exercise. However, I would have to say that I think that the funding council is very

[**Mrs Spelman** *Cont*]
responsive to a number of these concerns. It is, as you will know, intending to run a major consultation exercise on the future of the research assessment exercise and my own belief is that it will take account of a number of these things as best as can be done. Nothing of this sort is going to be either perfect or cheap.

Chairman: May I just ask Mr Beard to ask his question as it may be appropriate to tag it on to your answer.

Mr Beard

75. It follows on from what you have been saying, Professor Joyner. Quite a few of the submissions that we have got do point out that the research assessment exercise militates against multidisciplinary working. What would you do to amend it to avoid that?

(*Professor Joyner*) The suggestion that we put in our evidence to Dearing from my institution is that universities be asked to identify that which they believe is truly interdisciplinary within the exercise and to indicate where they feel that is most effectively assessed. My own belief is that that would happen, that the number of submissions would be relatively small, and it is something which the funding council could deal with. It is not however an easy question. It is a problem that the research councils also have in assessing interdisciplinary and multidisciplinary. They have tried various structures over the years with varying degrees of perceived success.

(*Professor Boulton*) Mr Chairman, if I may just add to that, the research assessment exercise, of course, is an economic instrument which drives behaviour. The question is, what sort of behaviour does it drive. It drives my behaviour. I manage the submission in science and engineering at my university in Edinburgh in the research assessment exercise and what is quite clear to me from that is that because of the global non-viability financially of the UK university system its success in competitions like the research assessment exercise gives a black bottom line. If we are not successful in it, then we could go into very severe deficit. The key driver is the need to maintain our income. What I manage for if I look at myself in the mirror in the morning is not the quality of output, but financial success. When it comes to the research assessment exercise I think that I have got a fairly acute view of those components of a submission which will determine success and I have to think very carefully and tactically how to package the bid together in order to be successful. One of the things that it is very difficult indeed to do is to package cross-disciplinary—I think multidisciplinary is the wrong word—interactions in such a sense that they will be successful in the individual panels. Now, of course, you must know your panels, and that is quite important. Some of them are a little bit more flexible than others. In my view the RAE has been a very significant inhibitor of the capacity of the system, the university system in Britain, to generate novelty and the way in which it goes about doing its research over the last decade.

Chairman

76. May I take that a little bit further. You said, and I paraphrase, that when you make your bid you do not bid necessarily on quality of output, you bid for financial success. You more or less said that?

(*Professor Boulton*) Not quite, no. I manage for financial success.

77. Right, now what are the factors then if it not primarily of output that you have to take into account to enable you to manage for financial success?

(*Professor Boulton*) A key driver, Mr Chairman, is the policy of the research councils and the policy of the European Union. Where they place research funding. I think that the fundamental way in which dual support has collapsed is that in former times dual support was a system whereby one had an exploratory opportunity in doing research funded through the funding councils, you could poke into odd corners that did not potentially look promising, and then if you found something worth pursuing you got research council money. Now that really does not happen any more. If I put funding council resources into the department in Edinburgh, then what I do is place it where I know that there will be strong leverage for research council funding. In other words, research council policies are driving almost the whole of the system.

78. Yes, that is how you start.

(*Professor Boulton*) Yes, and as a consequence the exploratory component has gone. Now when we refer back to some of the questions earlier, Dr Gibson's question, what should the system be like? My view is that I do not care what the system is like as long as it delivers two key things: the capacity to explore; and the capacity to follow up. I think that we have actually lost the former and the arteries of our research, I think, are beginning to stiffen as a consequence.

Dr Jones

79. In terms of the type of projects that the research councils would fund, they themselves must have another tier of influence. Would you say that they are influenced by Government in terms of which projects they would support?

(*Professor Boulton*) I work on the ground floor of the research councils. We look at government policy; we start from the 1993 White Paper; we say: what do we think we have got to hand to John Cadogan so he can talk to the Treasury and get the money to trickle down; and our view still is that it is to a large degree wealth creation and the quality of life and that in a sense we must manage towards that. As a consequence the research council agenda is highly problematic.

80. I expect that there is extra funding for BSE, for example?

(*Professor Boulton*) I am sure.

Chairman: Thank you very much. We would love to go further on this, but we just do not have the time.

Dr Turner

81. It is clear from what you have all been saying that you share my view that the present system of research assessment exercise works to suppress innovation and I could think of several examples, to use your own words, that would have been closed down or never supported and we simply would not have the whole modern field of biotechnology if it were not for certain seminal individuals who produced hardly any papers ever in their lives but all ended up with Nobel prizes and made seminal contributions. Therefore, this really is critical to the future of British science to get it right. Can you say then how you think the research assessment exercise should be simplified, become less of an administrative drain on time and energy, be less formulaic and give more weight to sound judgment, and can I add to that, permit innovation?

(*Professor Joyner*) Mr Chairman, that is a question! The simplification of the research assessment exercise is something that is being looked at at the moment. I am not sure that the real requirement is to simplify it because the things that go into the research assessment exercise, the output of research produced, the levels of external support and the recognition that they have for that, they are things that have to be in there. I think that the concentration on four papers is probably not helpful in science and technology, but I think that one of the things that Dearing recognised was that there is no international dimension to the research assessment exercise and that is something that really is quite important, given the international nature of the scientific project. There is a real problem in doing all the things that you suggest. You can do it, and it has been suggested that you simply take the current research assessment scores and financial package that flows from that and just freeze the system and let it go on from there. That will undoubtedly work for a time, but, as is happening, for example, with the CNRS system in France where that is essentially what they have done over the years, it will ossify. Therefore, you do actually need to have a means to ensure that there is transfer of funding from one department to another, from one institution to another. I am not quite sure therefore how you reconcile these concerns, but my colleagues probably have more developed views than I do on some of these things.

(*Dr Mulvey*) Mr Chairman, it is very easy, of course, when one has to make very difficult judgments, to try to introduce some sort of measure that allows you to use a formula, and I entirely sympathise with this. I think the problem is that we have become over-impressed with the ability to measure things rather than just value them by judgment. Now for what it is worth, Mr Chairman, I think that one ought to have assessment which also brings in judgment and is not so bound by adding up the scores from the formula. People worry about that because it means that people's prejudices can come into play, but life is just not perfect and I would rather have informed prejudice than a blind formula.

82. You are clearly worried about concentration into fewer and fewer departments and, as you describe it, an ossification of the structure. In what ways do you see the research assessment exercise could be adapted to encourage a broad diversity in the missions of university departments and strengthen the link between teaching and research?

(*Professor Joyner*) The dual funding mechanism, of course, does provide that continuing flexibility.

83. But one side of it has been drained to feed the research councils?

(*Professor Joyner*) That is why we are against any further transfer from the funding council side to the research council side, and I am grateful for the opportunity to state that quite explicitly. The question about the link between teaching and research is an important one, I think all of us as academics would agree. Also I think that all of us would agree that we are not going to have 115 or whatever it is universities who are all active in front-line research. My own view is that in terms of looking at inter-institutional co-operation or in failing to look into the opportunities provided by that, Dearing missed a significant opportunity that should be explored. I know that Professor Saunders has developed views on this as well.

(*Professor Saunders*) Mr Chairman, I think that this is one of the greatest weaknesses in Dearing. He mentions and talks about a need for funding to support research in scholarship, but he does not explain how this is to be done and, as has just been said, we know that we are not going to have 150 cutting edge research universities, but I think that it is a very important question to ask to what extent do we want the teaching of the future (a) scientists and technologists and (b) those who are up to date in science and technology more generally to be done by people who are not themselves active in the field. It is a very difficult question, and I am not going to give you an answer here because I cannot, but I felt that Dearing really did not address it; and I think this is one of the places where we are worried that, for example, the DFEE, whose primary responsibility this is, will not see the problem in the way that I think the science community and this Committee should because it is one that is going to be very important for science. May I just close, Mr Chairman, by saying that I am rather worried because the word "scholarship" keeps turning up. I was absolutely astounded at the way that Sir John Cadogan defined it. If I read him correctly experimental science is research and theoretical science such as wins Nobel prizes is scholarship. This struck me as odd. The correct view seems to be that scholarship is something that you can do for £500 a year because that is the amount that has been set for it. I think that it is very worrying because people throw about the word scholarship as the alternative to research—it is the scholarship that one does to enable the non-researcher—I come from a grade five department so I am not complaining personally—but it is that which will enable these people to do their job properly. I would know whether or not I agree with that if people who used the term would explain what they mean by it. None of them do. I think this is a very serious problem because it looks as though there is a solution when in fact none has been proposed.

Mr Turner: You mean that it is a bogus distinction.

Dr Kumar

84. I have just a very quick question, Mr Chairman. From what you have been saying this afternoon to us, I somehow get the feeling that you are saying that everything was wonderful, there was a golden age, we did things in a different way, then it all went wrong and now we are telling you that we should have gone back to this golden age. I may be unfair in trying to put it all in a nutshell, but are you saying this or are you not saying this?

(*Professor Joyner*) I think that in a sense we are saying that because we make no apology for the assertion that UK science is and has been and remains at the forefront of science in the world, so in that sense there has been a golden age for science and it is demonstrated, as Sir John Cadogan was at great pains to indicate to you, in Nobel prizes and so on. It is demonstrated by a wide range of other measures, including citations for published data and published data per pound injected and so on, so in a sense we are saying that there was a golden age. What we are saying is that the continuance of that golden age has been threatened and that as time has gone on the threat to the continuance of that golden age gets worse and worse and that we are at the present time living on past glories and our ability to stay at the forefront has been eroded and continues to be eroded at a serious rate as we speak.

Chairman: Professor Joyner, you will appreciate that we have only a limited time and I know that Dr Mulvey would like to say something else, but we would always be happy to receive in the post anything that you wanted to say that there is not time for today. We are now going on to scholarship with Dr Jones now.

Dr Jones

85. Mr Chairman, I think that we have covered the point already, but am I reading you correctly by saying that you fear this mention of the word scholarship as a way of undermining research, getting quality in the universities on the cheap rather than actually by having practitioners who are doing the teaching?

(*Professor Saunders*) Mr Chairman, may I just say that I think that it is a way of avoiding the real problem. The problem is, how do you make sure that the teaching is done by professionals even in those places which are not the cutting edge, and to say "scholarship" is not a solution.

86. So what are your views on Dearing's proposal for a fund of £30 million to support scholarship and where do you think that this money should come from?

(*Professor Joyner*) I know that the chairman wants us to be brief. The idea that you can allow a member of teaching staff to be aware of developments in their subject at the highest level for £500 a year, which to a garage represents ten hours of a mechanic's time, is a nonsense.

87. The Committee of Vice Chancellors and Principals have proposed that there should be additional allocations for teaching. Do you favour that sort of approach?

(*Professor Joyner*) I am sorry, Mr Chairman, I am not familiar with the CVCP approach to this.

88. They have stressed the need for scholarship to underpin all teaching and therefore favour a significant enhancement of the unit of research for teaching rather than some departments opting out of the research assessment exercise.

(*Professor Joyner*) I think that that makes sense. In my own institution we have a rather rigid contract and that says that people are allowed 200 hours a year for scholarly activity to underpin their teaching. Now that is under a contract if they have 1,500 hours a year, and at that sort of level it is doable. People can support their teaching at that sort of level, but not at the Dearing rate.

Chairman: We will just go on to information technology now and then to equipment and infrastructure, and I think that will be all that we will have time for.

Mr Jones

89. In paragraph 17 of the memorandum you mention that there is at present a serious overload of the international network of traffic. How serious is that? What evidence do you have for it? What are the solutions? Do you have any idea how much it would cost?

(*Dr Mulvey*) Mr Chairman, The experience of anybody who tries to send files and other information overseas, not nationally, I think, is that it is just too slow, the whole thing is jammed up. I think Professor Geoffrey Boulton has a comment.

(*Professor Boulton*) Mr Chairman, yes, I just have a comment which underlines the importance of this. My view is that science is becoming much more of an international operation and in a sense one of the key things that we have got to do is to ensure that we are part of the international club that is doing it. All sorts of electronic mechanisms are there which permit us to interact very fully with major computers on another continent. The thing that actually is inhibiting this seriously now is the absence of broadband capability to send information backwards and forwards, so the essential capability is there to do the work but the volume of traffic cannot be dealt with. It is something that we have to take very seriously.

Chairman: Thank you, Professor Boulton. Then for our final question we go to Dr Williams: equipment and infrastructure.

Dr Williams

90. In this shortage of money for equipment and infrastructure, if no more money is coming from the Government—and that is the case—for the next 12 to 18 months, then can industry or research charities provide more, or should they do so?

(*Professor Joyner*) Mr Chairman, I think that our answer to that is fundamentally no. I think that there are two parts to that. One is that I do not think that they are going to do it. The research charities, in particular the medical charities, are taking the view rightly or wrongly that this is not something that they should do and, if they are required to do this, they will move their support abroad. This is the view of

[**Dr Williams** *Cont*]

the Wellcome Trust which as a charity spends more money on medical research than the Medical Research Council, so that is not going to happen. I do not believe that industry are going to step in in the short term. I think our answer is equally that in looking for this Dearing is essentially being unreasonable. I think our feeling is that it is recognised worldwide that it is the responsibility of a Government that wishes to have an effective scientific research infrastructure for the Government to provide that because nobody else is going to. Lastly—and this is a point that our meeting made very effectively to the Minister—leaving this for 12 or 18 months is going to allow the damage to reach much too serious proportions. This is a crisis. That is not a word that scientists use lightly, but we are seeing cuts year on year in a situation where our competitors have been expanding for many years and continue to expand.

Dr Jones

91. Do you have any evidence of British money from British companies or charities going abroad where it would previously have come to this country? I think that is a very important point, Mr Chairman.

(*Dr Mulvey*) Mr Chairman, I think that it has been said by Sir Richard Sykes, chairman and chief executive of Glaxo Wellcome—and I cannot remember exactly the figures—that whereas a few years ago let me say 5 or 10 per cent of the money that they put into university research went abroad, now I believe it is 25 to 30 per cent. I want to make one other quick remark, if I may, in terms of whether or not it is reasonable to expect industry to put more money in to solve this problem. In so far as international comparisons are of some value as indicators, British industry seems already to be putting in about the same sort of proportion of cost of the academic research as one finds in Germany and in the United States of America. In one place Dearing lightly supposes that this could be doubled and, as Professor Joyner has said, this seems to be quite unreasonable.

92. But Richard Sykes was on the Dearing Committee, was he not?

(*Dr Mulvey*) That is a fact, yes.

(*Professor Joyner*) Mr Chairman, yes, he was indeed, but his company's evidence to the Dearing Committee was one of the strongest expressions of concern about the deteriorating infrastructure and that their response to that would be progressively to move their research abroad.

Chairman

93. Professor Joyner, I think that we have to finish there. We have had nine people asking four people questions. There have been nine of us wanting to speak and four of you wanting to speak. I think that to have got through what we have got through we have done extremely well. However, we do realise that there are questions that we have not asked and there may be questions that you would have wanted us to ask but we have not had time to ask you. If that is the case, Professor Joyner, we would be most grateful if you and your colleague could find one hour of time—at £50 an hour or whatever it is you have indicated you charge at!—to write to us with the answers to the questions that you wanted to be asked but we did not ask you. We do thank you very much indeed for coming along, all four of you. You have been most helpful. We hope that you will look forward to seeing our report in due course. We thank you most warmly for your contribution to our findings. Thank you very much.

(*Professor Joyner*) Thank you very much, Mr Chairman, for the opportunity to meet you.

Chairman: I declare the meeting closed.

Supplementary Memorandum submitted by the Office of Science and Technology

Following its original memorandum of 22 October 1997 and the appearance of Sir John Cadogan, Mr Tony Quigley and Mrs Helen Williams before them on 5 November 1997, the Committee asked OST to provide a supplementary memorandum covering the following points.

Do you agree that Dearing's proposals for alterations to the RAE would "lead to a substantial improvement in the cost effectiveness" of the exercise?

2. OST is not able to express a view on this statement since we do not have available to us any relevant data or comparators by which to judge it. The cost effectiveness of RAE is one of the many issues covered in the consultation document, foreshadowed in our earlier memorandum and published by the Higher Education Funding Councils for England, Scotland, Wales and the Department of Education Northern Ireland on 12 November 1997 (: HEFCE ref RAE 2/97). This document contains 42 separate questions ranging fully across the purposes, principles, scope, processes and means for assessing research including one inviting views and points not otherwise covered.

3. On this particular Dearing proposal, the document seeks views on the basic idea, namely of dissuading departments to enter the RAE and offering incentives to focus on teaching and other activities. One option it suggests is to make entry to any future RAE conditional on the payment of a "deposit" for each submission, which would be lost if a lower than specified grade was achieved. The document continues by seeking views on how this option could possibly be developed in tandem with the development of policies and incentives to strike a new balance with teaching.

How can a system based on past performance, as the RAE is, encourage long-term development of research excellence? Should more allowance be made for changes such as the nurturing of new, young researchers?

4. As noted in paragraph 11.15 of the Dearing report, the NCIHE heard "that there was real merit in a national system of research funding that was partly retrospective (ie based on track record as is the RAE) and partly prospective (i.e. responsive mode Research Council funding)". This reflects an underlying principle of RAE linked funding, which is common to other investment decisions e.g. by fund managers and insurance companies, that past record is a good indicator of future performance and is borne out by the record of RAE so far with Institutions being free to decide which staff to submit for assessment. The consultation document already mentioned seeks views on whether and how a more formative element could be introduced into the RAE process.

5. While the use in the RAE of historical data such as income earned and papers published during the "qualifying" period gives a retrospective picture, the data are focused on staff in post at a specific date, thereby involving a certain prospective element. Moreover, the danger of ossification by over reliance on retrospective data is offset by regular updating of the minor volume indicators used in the formula, reliance on institutional management in the use of the total funds provided, and by funding from other sponsors of research in addition to this funding formula. For instance, the new funding arrangements recently introduced by the Medical Research Council include provisions to support and develop new talents, called "career establishment grants" and new provisions by EPSRC for new appointees.

Would you welcome increased selectivity in the public funding of research? What would be the consequences of increased selectivity?

- *Does Dearing go far enough in his suggestion that funding should be restricted to those departments scoring 3a, 4 and 5 in the RAE?*

6. The principle of selectivity of funding based on assessment of research quality is followed by both sides of dual support and indeed other sponsors of research such as the Charities. For Research Council grants, the criteria is one of excellence judged through case by case peer review while for RAE linked funding it is based on a series of standards with the highest weighting relating to international excellence.

7. RAE linked funding is aimed at ensuring that the funds for research element of block grants are not spread too thinly. Policy is a matter for Ministers while its execution falls within the responsibilities of the Funding Councils and DENI. In applying the policy, account is taken of the dangers of over concentration by weighing such considerations as:

- balance to maintain a broad base of research and training across the RAE subject areas and to encourage research potential;
- diversity to promote distinct research missions; and
- competition to avoid ossification through all institutions being eligible to receive funds if they meet the qualifying criteria.

8. Thus following RAE 92, these criteria were set with the lowest qualifying RAE grade of 2, whereas after RAE 96, the lowest qualifying grade was set at 3b for Quality Related Funding (QR) in 1997–98. The actual QR allocation made to each recipient institution is also effected by decisions concerning the weights to be given to the cost banding of subjects and volume measures in the formulaic methodology for determining the QR element of individual block grants for teaching and research.

9. For England and Wales this methodology has two distinct stages, first the allocation from the total budget available in any year for QR funding of a sum of money to each of the 69 Units of Assessment (UOAs) of the RAE 96 taxonomy; and then distribution to each Institution, using their quality (RAE) weighted research volume for each of the subjects in which they qualified through their RAE grade for that subject. The total QR funding each receives is the sum of these components.

10. The resulting degree of selectivity therefore reflects the balance of the decisions taken regarding these various factors in the formulae with each factor thereby being a particular dimension of selectivity, as Tables 1-2 illustrate. Table 3 illustrates the degree of concentration of funding across the dual support arrangements among the 30 biggest recipients:

- at the institutional level—13 Universities received 50 per cent of both QR and Research Council funding in 1995–96 (most recent year for which figures are available) and that some 30 Institutions received some 70 per cent of the QR and RC grant funding;
- at the departmental level, around 75 per cent of HEFCE QR funding is currently allocated to RAE 96 grades 4, 5 & 5*. [This compares with around 70 per cent in 1996–97 for RAE 92 grades 5 or 4 in the 1992 RAE.]

In its recently published response to Dearing, the CVCP reaffirmed its view that the present level of selectivity is broadly acceptable.

11. These tables also indicate the effects of increasing selectivity still further. If, for instance, HEFCE raised the eligibility threshold to 3a from the current lowest qualifying RAE grade of 3b, some 4,000 researchers would be excluded, releasing around £30 million. Moving the cut off still higher from grade 3a to grade 4 would mean some 41 per cent of staff entered in RAE 96 (compared with 13 per cent currently) would not be eligible for HEFCE funding, releasing a further sum of around £70 million.

What is OST's response to Dearing's proposals for an Arts and Humanities Research Council? Should such a research council be part of the structure of OST as suggested by the Committee of Vice Chancellors and Principals? (Dearing Report, para 11.50)

12. Ministers are still considering this proposal in the context of the comprehensive spending review. In addition to funding and running cost considerations, it would require primary legislation to implement. Among the facts to consider are the following.

13. The Dearing report argues for an increase of £25 million for Arts and Humanities research, apparently on the ground of comparison with ESRC. We are unable to provide any other justification for this and would have difficulty in establishing any particular figure. The report does not recommend such funds coming from the Science Budget.

14. Appendix 3 of the report indicates that an Arts and Humanities Research Council (AHRC) could not operate in exactly the same way as the other existing Research Councils, arguing that various differences should be respected. Besides the varying nature of research activities and the respective communities, there is also the sheer scope of the arts and humanities fields. For instance, the existing Councils represent 35 of the units of assessment (UOAs) in the RAE taxonomy, whereas the other 34 UOAs cover the Arts and Humanities. AHRC could not operate in exactly the same way as the other Research Councils. Each Grant Committee (or whatever structure was agreed for such an AHRC) would clearly have to cover one or several of the UOAs. Because of the likely small size of grants, methods of working would need to be tuned to very small grants, otherwise the overheads would represent too high a proportion.

15. By way of illustration and by analogy with ESRC, which spends roughly £40 million a year on grants with an average value of £35k, the AHRC would probably be awarding some 125 new grants a year. There is a question of how many grant awarding panels there should be for such a broad and heterogeneous field. But if one panel was required for each UOA, each panel might only be dealing with some four grants a year, raising issues of costs, economy, and efficiency. The ESRC's total overhead is around 5.4 per cent, which covers grants processing costs which are more or less constant per grant. If the average grant were smaller for AHRC, these overheads represent a larger fraction of total costs, meaning that the AHRC overhead would be nearer 9 per cent than the current 5.4 per cent for ESRC. This matter would of course need to be judged in the overall cost benefit analysis including the option of co-location (paragraph 11.50 of the main Report).

16. As for an AHRC falling within OST's responsibilities, paragraphs 40 and 44 of Appendix 3 argue that this is needed in order for it to co-operate with the other Research Councils. These Councils already work closely with many other bodies beyond OST's particular portfolio—such as the charities, industry, other Government Departments and Agencies, particularly the Funding Councils. Further, paragraph 36 of this Appendix 3 notes that such an arrangement would not fit comfortably within DTI (the parent Department of OST) and also proposes that OST would have to be renamed, reconstituted and relocated.

17. It will be for Ministers to decide that there should no longer be an Office of Science & Technology as such with its ring fenced budget. In turn, this would raise questions as to who should head the organisation (with the remit broadened from science, would it still be the Chief Scientific Adviser?) and the type of person looked for in the Director General of the Research Councils, who would no longer be speaking only for science and technology. Ministers will be considering the ramifications of these proposed, profound changes in the light of the present budgets—£25 million vs £1.3 billion for the Science Budget.

Do you (OST) support Dearing's proposals for an industrial development fund? How else could universities be encouraged to work more closely with local and regional industry, particularly SMEs?

18. The Government is currently considering these proposals in the context of the comprehensive spending review which embraces the range of existing government schemes which assist or promote academe-industry collaborations.

19. While Dearing suggests simplifying existing national schemes funded by DTI and other Departments in the context of its proposal for the IPDF, we should perhaps draw the Committee's attention to the apparent regional focus of these proposals and the fact that the various national schemes mentioned such as LINK and the Teaching Company Scheme serve distinct purposes, though broadly falling within the category of state aid for industry. Additionally, DTI has only recently completed an exercise to simplify its support schemes to better serve its customers.

20. Further the main schemes supporting research and development *per se* are purposely limited to pre-competitive research since applied, near market research and development aimed at commercial exploitation is properly left to those involved to finance from private sector sources. The exceptions are SMART and SPUR for small firms. For these reasons therefore, particularly careful consideration needs to be given to the nature of the activities which could and should be supported through such a fund. For encouraging and supporting business links with universities, the range of requirements on both sides, demands a plurality of approaches and mechanisms.

Would greater selectivity in the public funding of research discourage collaborations with industrial partners?

21. Many, if not all, universities, of course, already have strategies and arrangements for working with companies in many different ways and on many different but often connected matters, ranging from training through consultancy, technology transfer and research and development. While local and regional links with companies are undoubtedly important in many cases, universities which have "world class" expertise in particular fields operate at national and international levels. Conversely, companies generally decide which universities to work with according to their own requirements and circumstances.

22. It is therefore extremely hard to judge what difference greater selectivity of QR funding would actually make. It implies that there will be a smaller number of HEI locations where particular expertise will be available. But this does not necessarily mean that there would be a smaller, insufficient number of people with the expertise. Nor does it mean that universities would be unable to draw on other funding sources to support these activities, as they do now. Further, firms are themselves quite selective in who to work with on what. For instance, most CASE awards and EPSRC Collaborative projects are with departments having high RAE scores. It might therefore be argued that greater selectivity would actually foster industrial support for research in universities by ensuring that funding for infrastructure is adequate.

International comparisons of levels of industry financing for university research

23. Table 4 provides an international comparison of the percentage of higher education Research and Development (HERD) funded by business in the G7 countries, extracted from OECD's latest statistics.

The Government's ability to contribute to the proposed revolving infrastructure loans (sic) fund under current rules relating to the PSBR

24. The Government would have to consider carefully giving large sums of money to a fund that it neither owned nor controlled. If the fund was not set up in the public sector—that is the fund was neither owned nor controlled by the government—then the transactions of the fund would not affect the PSBR. However any government payment to or recipts from the fund would affect the PSBR. All policy lending on whatever terms would increase the PSBR when the loan was made and reduce it when the loan was repaid.

25. This is the purpose of the PSBR—to measure the public sector's requirement to borrow. The borrowing, whether for loans or grants, adds to the National Debt. It also increases the debt as measured for the Maastricht Treaty—Gross General Government Debt. By contrast, the Maastricht measure of deficit—General Government Financial Deficit excludes loans and thus in effect recognises that these are assets. Both the PSBR and the Maastricht measure of deficit were published in Table 4.1 of the July 1997 "Financial Statement and Budget Report".

November 1997

Table 1

CONCENTRATION OF HEFCE QR FUNDING BY 1996 RAE GRADE IN 1997–98

RAE Grade	3b	3a	4	5	5*	
HEFCE QR	4%	11%	27%	33%	25%	(of total of £684 million)
Nos of research active staff (FTE)	11%	17%	26%	21%	13%	(of total of 38,848)

Footnotes

(1) The weighting factors set by HEFCE for the 1996 RAE grades were

	3b	3a	4	5	5*
HEFCE	1.0	1.5	2.25	3.375	4.05

Table 2

HEFCE QR UNIT FUNDING LEVEL IN A SAMPLE OF UOAs FOR 1997–98

RAE Grade	*3b*	*3a*	*4*	*5*	*5**
	£s	*£s*	*£s*	*£s*	*£s*
Chemistry	7,925	11,888	17,832	26,748	32,097
Pure Maths	7,139	10,709	16,064	24,095	28,915
General Eng	7,200	10,799	16,199	24,298	29,158
Economics & Econometrics	5,099	7,648	11,472	17,208	20,650

Footnotes

(1) In certain cases institutions made multiple submissions to a particular Unit of assessment in the 1992 Research Assessment Exercise. These ratings were averaged before using the QR model, and the corresponding outputs have been incorporated in this table to the largest under the nearest larger integer rating. This may skew any attempts to reconcile the above figures with actual QR allocated to individual institutions

(2) Figures for 1997–98 exclude the R component of capital funds (£50m). This capital component has been allocated pro rata to the subject quanta before determining each institution's block grant for research.

(3) The figures for 1997–98 are based on the moderated quanta being used by HEFCE to phase in change in funding method for determining funds for each UOA (the subject quanta) over three years, starting 1997–98. The equivalent unmoderated quanta, the target for 1999–2000, are:

	3b	3a	4	5	5*
	£s	£s	£s	£s	£s
Chemistry	7,122	10,682	16,024	24,035	28,842
Pure Maths	4,852	7,277	10,916	16,374	19,649
General Eng	7,125	10,688	16,032	24,048	28,858
Economics & Econometrics	3,795	5,693	8,539	12,809	15,371

Table 3

FUNDING COUNCIL AND RESEARCH COUNCIL FUNDING STREAMS INTO HEIs IN 1995–96

HEFC research grants	*£m*	*Per cent*	*Cumulative Per cent of total*	*Research Council research grants*	*£m*	*Per cent*	*Cumulative Per cent of total*
Cambridge	44.79	6.0	6.0	Oxford	34.36	7.2	7.2
Oxford	43·84	5.9	11.8	Cambridge	34.33	7.2	14.5
Edinburgh	29.40	3.9	15.8	Imperial College	22.08	4.7	19.1
UCL	27.44	3.7	19.4	UCL	21.06	4.4	23.6
Manchester	27.35	3.7	23.1	Edinburgh	19.69	4.2	27.7
Imperial College	23.43	3.1	26.2	Birmingham	18.71	3.9	31.7
Glasgow	22.10	3.0	29.2	Manchester	14.54	3.1	34.8
Birmingham	21.92	2.9	32.1	Leeds	14.04	3.0	37.7
Leeds	20.44	2.7	34.8	Glasgow	13.28	2.8	40.5
Sheffield	17.32	2.3	37.1	Southampton	13.04	2.8	43.3
King's College	17.05	2.3	39.4	Nottingham	11.71	2.5	45.7
Nottingham	16.93	2.3	41.7	Liverpool	11.67	2.5	48.2
Bristol	16.63	2.2	43.9	Bristol	11.66	2.5	50.7
Newcastle upon Tyne	16.61	2.2	46.1	Sheffield	11.65	2.5	53.1
Liverpool	16.36	2.2	48.3	Warwick	9.22	1.9	55.1
Southampton	15.84	2.1	50.4	Newcastle upon Tyne	8.39	1.8	56.8
Warwick	14.20	1.9	52.3	King's College	8.27	1.7	58.6
Strathclyde	14.00	1.9	54.2	Leicester	7.18	1.5	60.1
Wales, Cardiff	13.99	1.9	56.1	Bath	6.90	1.5	61.5
Queen Mary	11.38	1.5	57.6	UMIST	6.83	1.4	63.0
Reading	11.10	1.5	59.1	Sussex	6.51	1.4	64.4
UMIST	9.88	1.3	60.4	Reading	6.17	1.3	65.7
Sussex	9.83	1.3	61.7	Durham	6.17	1.3	67.0
Leicester	9.57	1.3	63.0	Queen Mary & Westfield	6.12	1.3	68.3
Durham	9.14	1.2	64.2	York	6.08	1.3	69.5
Queen's Belfast	9.07	1.2	65.4	Strathclyde	5.43	1.1	70.7
United Medical & Dental	8.94	1.2	66.6	Essex	5.11	1.1	71.8
Lancaster	8.90	1.2	67.8	Surrey	4.90	1.0	72.8

HEFC research grants	*£m*	*Per cent*	*Cumulative Per cent of total*	*Research Council research grants*	*£m*	*Per cent*	*Cumulative Per cent of total*
Wales, Swansea	8.35	1.1	68.9	Queen's University	4.87	1.0	73.8
Exeter	8.32	1.1	70.0	Loughborough	4.69	1.0	74.8
Top 30 total	524.13			Top 30 total	354.67		
All institutions total	748.62			All institutions total	474.09		

Table 4

INTERNATIONAL COMPARISON OF BUSINESS SUPPORT FOR R&D IN HIGHER EDUCATION

HIGHER EDUCATION R&D (HERD)

	UK	*Canada*	*France*	*Germany*	*Italy*	*Japan*	*USA*
HERD as per cent of GDP	0.39	0.39	0.38	0.43	0.27	0.57	0.40
Per cent funded by business	7.7	11.1	3.6	7.1	4.7	2.1	5.4

Supplementary Memorandum Submitted by the Save British Science Society (SBS)

INTRODUCTION

1. This Memorandum is the response of SBS to the Select Committee's invitation to answer further questions (Part A), submit additional comments (Part B), and further substantiate the claim made by SBS in its oral evidence that the Department of Education and Employment gives too little weight to its responsibilities for research in the universities (Part C).

PART A: QUESTIONS FROM THE COMMITTEE

Q1. *Would the revolving loan fund solve the problems in infrastructure and research equipment if funding for such a loan could be secured?*

2. In principle yes, but *time is of the essence, and money* must be available to repay the loan.

3. Time: at the meeting with John Battle in Leeds the clearest message to emerge was that the crisis is 'now'; waiting one or two years for a solution—such as would be necessary to build up the loan fund as proposed by Dearing—would see continuing damage and the disappearance of good research groups unable to maintain internationally competitive quality of research.

4. Money: loans have to be paid back; it was proposed that this be done out of the 'enhanced' payments for indirect costs from the research councils. This might be reasonable provided: the £110 million p.a. needed by the research councils is made available *as new, additional money* and *not* by transfer from the Funding Councils; *and* the sum is adequate to meet the indirect costs[8] in full, so that it can be considered to contain an appropriate allowance for depreciation of equipment and infrastructure. But, even then, the sums don't add up: whatever allowance may be included in the estimated £110 million presumably corresponds to an average steady-state, not the present situation of crisis in which a massive investment back-log of £1 billion exists (counting the requirements for research and teaching).

Is there a plausible alternative to government funding for such a revolving loan fund?

5. So far the signs do not look good, and the President of the Board of Trade has herself expressed doubts. Industry and the charities are not enthusiastic about putting money into a general pot, rather than helping to fund specific programmes of research which they know to be of interest to them, and clearly meet the conditions of a charitable trust.

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[8] The indirect costs should eventually be based on assessments of actual cost, not as a proportion of salaries.

6. Significant tax concessions might provide an encouragement for companies to make gifts of equipment or money, as in other countries.

7. Government is the only feasible source, especially to meet the size and urgency of the need. But the Treasury rules would have to be changed, as in the case of loans for fees, so that the PSBR is not affected.

8. Governments in Canada and Sweden have set up Trust Funds to finance equipment and infrastructure expenditure for universities.

Q2. *Do you think that the Private Finance Initiative (PFI) has any role to play in the funding of university infrastructure and equipment?*

9. No significant role except for very large items of long life and with multiple use. The PFI is appropriate in cases of investment which generate a substantial, stable long term income stream such as a Hall of Residence that also has lasting intrinsic value and may require maintenance but not 'rebuilding', unlike a piece of 'frontier' research equipment which can be obsolete in three years. The decision of the DfEE in 1995 that the massive cuts in capital grant could be replaced through the PFI was made in reckless disregard of how the funds were being used in the science context (see ANNEX A for illustration).

Q3. *How best could interdisciplinary and collaborative research, especially with industry and commerce, be encouraged and rewarded within the dual-support system? Do you agree with Dearing's findings that the RAE tends to penalise interdisciplinary research?*

10. Everyone wants to see these objectives achieved, and especially to attract participation of SMEs that traditionally have had little or no interaction with the science base, do no real R&D and in many cases have no real scientist or engineer on the staff. SBS has long held that this is another area where the dual-support system, properly resourced and encouraged, can play a unique role.

11. First, the wrong way: rely on a plethora of national schemes with complex rules of engagement, conditions and entry requirements judged by remote committees. The manager of an SME, with concerns tending to have a time horizon of a few weeks and not entirely convinced some R&D will not just be an expensive experiment, will probably not wish to attempt the first hurdle.

12. A much more likely way to success is the development of a one to one local contact, perhaps arising through a chance meeting, and a first, exploratory collaboration which might also bring in members of another department of the university, or another local institution. The university costs, at this stage, would use Funding Council money at the discretion of the university or department.

13. When enough has been done to indicate feasibility and a probable benefit, the next step can be an application to one of the appropriate regional or national sources. The dual-support funds under local management can provide the critical initial "pump-priming".

14. Applied research must be valued in the RAE—as SBS has argued for several years. This can help to encourage a broad diversity in the missions of university Departments and collaboration with other local institutions including industry and SMEs.

15. But there is a caveat: this requires additional sources of funds, it cannot be financed at the further expense of the basic end of the research spectrum.

16. Turning to the point on interdisciplinary research, yes we believe it is penalised by the RAE as presently operated. Competition is emphasised more than collaboration and Interdisciplinary research—or research involving collaboration between different core-subjects—tends to suffer in a review process based on the rating of single disciplines. Consequently, universities will tend to field clear, one discipline based programmes to maximise the chance of success.

17. The RAE needs to improve provision for universities to submit multi-disciplinary programmes for evaluation. Perhaps this would be helped by inviting preliminary, outline submissions so that an appropriate panel can be set up to judge the full submission.

18. Properly funded dual support also comes into play here to allow innovative multi-disciplinary research to develop to the stage where it can successfully attract its own share of funding council and research council support.

19. Procedural changes in the RAE, including provision of written feedback by panels and a right of appeal, would increase confidence in the exercise and guidance for Departments in their future planning.

Q4. *how do you respond to Dearing's proposal for an Industrial Partnership Development Fund? How can universities be encouraged to work with local and regional industry to provide companies with an applied research resource?*

20. SBS supports this idea of Dearing which recognises the value of links between university researchers and small businesses. This should go together with the suggestion for the establishment of an equity fund to assist the development of new businesses and the formation of university-linked incubator units.

21. Encouragement for the universities can be the reward of funding for challenging applied research and development, and the possibility of opening opportunities for activities by teaching staff in institutions or Departments not receiving funds for research under the present regime.

22. But, again, *new, additional sources of public funds are essential for such initiatives:* they cannot be launched at the expense of further reductions of the support for basic research in the universities.

23. The appropriate agency is the DTI, which has reduced annual expenditure at the interface between research and its application, in the "development gap", by almost £1 billion over the past few years. This trend should be reversed as a step in returning government support of civil R&D to a level more on a par with competitor nations.

Annex A

EXAMPLE OF EQUIPMENT AND INFRASTRUCTURE EXPENDITURES

24. At an SBS Press Conference in August 1996 one year's expenditure for a major life sciences school was described as follows:

- 50 per cent on essential equipment repairs and infrastructure modifications to meet Health and Safety (H&S) or other statutory regulations on equipment performance (eg autoclave, centrifuge).
- 25 per cent on apparatus for teaching laboratories.
- 10 per cent on essential building modifications to comply with H&S regulations—as teaching and research develop into fresh areas of activity.
- 15 per cent on new equipment for research based activities; includes replacement of obsolete basic equipment with latest, advanced performance equivalents matching industry/international standards. Expenditures for specialised, new research equipment include university share of a purchase part-funded by an external source, or on ancillary equipment, or for building/infrastructure changes (eg air conditioning) to accommodate and use a new research tool.

PART B: ADDITIONAL COMMENTS

1. DUAL SUPPORT AND CAREERS

25. The erosion of unit of resource and the decline in value of the research grant from the Funding Councils, accelerated by the transfer of £154 million to the Research Councils, has made the conduct of research in the universities almost totally dependent on external sources and so on short-term funding. This has been a significant factor, among others, in the great increase in the proportion of staff, both in research and in research support posts, in short fixed-term appointments.

26. At the time of the transfer[9] the salaries of many support staff until then on indefinite university funded contracts became vulnerable to the ending of research grants; and on their leaving the post usually became fixed term.

27. SBS supports the aims of the "Concordat". But if a satisfactory, properly rewarded, career structure is to be achieved without a major reduction in the volume of research in the universities, then a substantial increase in stable, long term funding—such as was provided through the Funding Council leg of dual support—is imperative.

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[9] Intended to solve the indirect costs problem, but succeeding in making it worse.

2. TEACHING AND RESEARCH

28. The objective of general policy for the universities should be to enhance the linkage of research with teaching. The RAE and Teaching Quality Assessment (TQA) should be designed with this in mind.

29. By research in this context we mean activity across the whole range from very fundamental research, through strategic and applied, to development and including "problem solving" in the, once taboo, area of "near market" in collaboration with, or on contract to, industry. This in turn means setting the criteria for RAE and TQA to give credit for such activities and their association with teaching, and incentives to develop the corresponding broad diversity in institutional and departmental missions.

30. Once again the qualifying mantra must be repeated: these benefits cannot be realised without making additional funding available.

3. SCHOLARSHIP?

31. The Dearing report introduced the notion of "scholarship" as an equivalent activity to research for staff in departments not receiving Funding Council grants for research. In the science and engineering context it is not clear what this equivalence means. If "scholarship" is "keeping up with the literature" and not practicing in one's field, either experimentally or theoretically, then a valuable stimulus to thinking about the subject is lost together with the important tacit component of understanding, not conveyed by books or publications.

32. Scholarship, in this form, appears to amount to little more than reading books on gardening but never leaving the armchair to enter the garden to handle plants and help them grow.

33. It may not be possible for all university teachers to practice in their field throughout their careers, but this should have been a significant part of their experience.

4. THE VALUE OF ACADEMIC RESEARCH

34. This is not the place to summarise or list the large number of reports and publications which show the high value, both cultural and economic, of the results of research done in universities, in addition to its value in the training of scientists and engineers. But we draw attention to a recent study[10] which examined the origins of the most influential scientific references quoted in nearly 400,000 US patent applications.

35. Seventy three per cent of the papers cited by US industry patents reported publicly funded research, with half of these performed in universities. The authors conclude that "public science is a driving force behind high technology . . . and is a fundamental pillar of the advance of US technology".

5. INTERNATIONAL COMPARISONS AND JAPAN

36. OECD data [11] show public funding of academic research in the UK to have grown more slowly than in the other countries of the G7 over the period 1981 to 1994, and in 1994 (latest figures) to be the lowest apart from Japan.

37. To reach the average of the others (including Japan) in terms of value per head of the national labour force would require an increase of about £500 million per annum.

38. Following a decision made by the Japanese Parliament in 1995 the government has embarked on a policy to double funding for basic research in Japan, mainly in the universities. This programme is well under the way, and although slowed by the recent economic difficulties the planned increase for next year is still 5 per cent, while the national budget as a whole is to fall by 7 per cent. The investment policy in Japan shows a long term determination to move into leadership in several areas of basic research including life sciences.

39. Closer to home, the Finnish government has recognised that survival in the next century depends on becoming a knowledge based economy. To achieve this it has engineered a National Concordat to increase public and private investment in R&D by 20 per cent.

40. On present spending plans, the UK science budget is due to *fall* by 5 per cent over the next two years.

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[10] The Increasing Linkage between US Technology and Public Science, Francis Narin and others, Research Policy 1997.

[11] OECD Basic Science and Technology Indicators, December 1996.

PART C: UNIVERSITY RESEARCH AND THE DEPARTMENT OF EDUCATION AND EMPLOYMENT

41. The universities perform 80 per cent of the research of the UK science and engineering base (an expenditure of £1,670 million in 1995) and train the next generations of scientists and engineers.

42. The Department of Education and Employment (DfEE) therefore has a critical responsibility to ensure the continuing health and quality of research in the universities. But, in evidence to the Committee, SBS has expressed a concern that the policies of the DfEE appear not to give adequate weight to these responsibilities. The Committee asked SBS to explain the grounds for its concern, and to suggest how the situation might be improved.

THE EVIDENCE

43. Apart from one event, the evidence is largely circumstantial but in our view it adds up to a convincing verdict of neglect.

44. The decline in the funding of research in the universities by Departments of Education, and which has led to the collapse of dual support as an effective mechanism, goes back at least to the early 1980s. Before 1992, when the Department of Education lost "Science" and the Research Councils went to the new Office of Science and Technology (OST) in the Cabinet Office, SBS had constructive interactions with Ministers of the Department, including meetings with two Secretaries of State: Sir Keith (later Lord) Joseph and John McGregor. There have been no such contacts since, and the Department's attention to these matters seems to have declined further.

45. The single most clear illustration of disregard for the needs of research in the universities was the massive cut in capital funding made at the time of the 1995 Budget—30 per cent in the first year becoming 50 per cent by the third year. The fact that this would cause serious, lasting damage by removing funds essential for up-grading laboratory infrastructure, the improvement and replacement of obsolescent laboratory equipment—expenditures not generally appropriate for PFI—was, we have been told, clearly expressed in the Science and Engineering Base Coordinating Committee but was ignored.

46. In May 1996 SBS sought a meeting with the Secretary of State, asking her to see a small group of university scientists so that she might hear directly the effects of the funding crisis. About the same time a survey by PREST had shown the capital costs of raising "top" laboratories to international standards to be a minimum of £474 million. No acknowledgement was received.

47. In August 1996 SBS organised a Press Conference, chaired by Sir Derek Roberts, Provost of UCL, inviting the media to meet the scientists who had not been able to see the Secretary of State. A report on the Press Conference was sent to Mrs Shephard, again stressing the damage cause by the cuts. This time there was a reply from the Minister of State, Lord Henley.

48. Speaking at a public meeting organised by SBS in December 1996 the then Minister for Science, Ian Taylor MP of the Department of Trade and Industry, admitted that the cuts in capital funding for the universities had been a mistake.

49. After the 1997 election SBS wrote to the incoming DfEE Ministers, congratulating them and hoping for an early opportunity to meet them. A reply from Dr Kim Howells MP, Parliamentary Under-Secretary of State, pointed out,understandably, that the new Ministers were in great demand and, noting that we were to meet John Battle MP, suggested that our questions (on dual support and other matters) could be discussed with him. This, we hoped, might be a sign of better coordination between DfEE and DTI/OST.

50. In all the post-Dearing discussion little has been said by DfEE Ministers on the role of the universities as part of the science and engineering base. With the emphasis all on widening access and provision for life-long learning—both aims SBS supports—the research element seems, again, to be being neglected.

51. It was in this context that an article by Baroness Blackstone, Minister of State with responsibility for Higher Education, appeared in *The Times Higher* of 17 October. In our view, it displayed a disappointingly narrow appreciation of the place of science in education and was expressed in an unfortunately dismissive tone. A later piece by the Baroness (*Times Higher* 24 October) did make some amends, and in a speech to a conference organised by SmithKline Beecham she went out of her way to stress repeatedly the Government's commitment to ensuring continuation of a strong UK science and engineering research base.

52. The DfEE is now preparing a White Paper on Higher Education, to be published in late January, which will foreshadow the major changes in the universities accompanying wider access and provision for "life-long-learning". But meeting these new challenges will put increased loads on university staff and a system already in a precarious state. There cannot fail to be a profound impact on the performance of the universities in their role at the centre of the science and engineering base. Yet, it appears, research in the universities is not on the agenda.

53. A White Paper planning a radically new, enlarged mission for the universities without taking fully into account their responsibilities at the heart of the national research base is deeply flawed from the start. SBS has written to the Baroness Blackstone (copy attached as Annex B) expressing our views and concerns, and repeating earlier requests for a meeting.

54. Finally, examination of the ordering of responsibilities within the present DfEE structure shows research very much on the side lines. It figures a one out of some 16 headings or sub-headings—ranging from Citizen's Charter through Deregulation, Green Issues, Legal Issues, Qualifications and Examinations, Training and Enterprise Councils, . . . covered by Dr Kim Howells, Parliamentary Under-Secretary of State. Research seems to appear nowhere else, it does not have a Divisional level representation.

IMPROVEMENT?

55. It might at first appear that the solution would be to let the OST take over all responsibility for research in the universities, leaving the DfEE only with teaching. This we most strongly reject. First because it would sanctify a separation between teaching and research, which we believe would be a fundamental error. The Department responsible for Higher Education must retain the base responsibility for academic research and work to foster connections with teaching. Second, the funding of research via the Funding Councils provides the second leg of dual support and so, for much of the research spectrum, the only element of plurality, of independence, in the research funding mechanism.

56. At the highest level in government it must be made clear to Ministers and civil servants in the DfEE that their responsibilities for the university research base are not to be neglected. If Dearing's Advisory Council on National Research Policy were in place, and chaired—frequently—by the Prime Minister this could be the forum for monitoring and developing policies for university research—with the SEBCC as a sub-committee containing independent members.

57. There is a clear need to have the research-base role of the universities given greater weight in the structure of the DfEE and hence in policy considerations. It should be a major part of the responsibility of a senior Minister, and have a section in the Department headed at an equivalent seniority level to those in the OST (eg, the Head of the Science and Engineering Base Group, Grade 3).

1 December 1997

Annex B

Letter from the Save British Science Society to Baroness Blackstone

May I congratulate you on your speech to the SKB "R&D Policy Symposium" which I listened to yesterday afternoon. Your clear affirmation of the government's commitment to ensuring the continuation of a strong UK science and engineering research base was very welcome.

The universities perform at least half the publicly-funded civil R&D, including 80 per cent of the research of the science and engineering base, and are responsible for the quality of the teaching of science and the training of future generations of scientists and engineers. The health and vitality of the UK science and engineering base is thus primarily in the care of the Department of Education and Employment (DfEE) with the funding of specific research programmes shared with the Office of Science and Technology (OST).

SBS has enjoyed a constructive relationship with the Ministers responsible for science policy and the OST since its formation. William Waldergrave spoke at an SBS organised meeting, as, by the way, have Michael Heseltine and the late John Smith. The President of the Board of Trade, the Rt Hon Margaret Beckett MP, will speak at an SBS meeting on 26 November.

Just three weeks ago SBS brought together a group of senior academics from a broad spread of disciplines to meet John Battle MP, Minister of State for Science, Energy and Industry. This was an occasion for informal discussion of a wide range of policy issues and we were all most impressed and encouraged by the Minister's evident interest and commitment through the half-day meeting. Some of the discussion is reflected in the enclosed memorandum submitted to the House of Commons Select Committee on Science and Technology.

Unfortunately, no doubt partly our fault, SBS did not succeed in establishing an equivalent relationship with the Department of Education in the previous administration. Since the present government came into office we have sought opportunities to present the Ministers SBS views on policies for science and research in the universities.

We are fully in support of improved access to higher education and welcome the concept of "life-long learning." "Science" subjects have, we believe, an essential place within the "life-long-learning curriculum" as part of education; that is, not only in a vocational training sense, although the course structures may differ. Meeting all the challenges will bring new changes and increased loads on a university system already in a precarious state.

SBS is deeply concerned that too little weight may be being given in the preparation of the forthcoming White Paper to the central role of the DfEE in carrying the major share of the government's responsibilities for the health of the UK science and engineering base.

We hope you will consider finding an early opportunity for SBS to meet you to explain these concerns.

Dr J H Mulvey, Director SBS

PS. SBS interests span the range of science and technology related issues from the teaching of science in the schools—where we strongly favour a "baccalaureate-type" breadth of subjects for the 6th form examination—to the relationship of the research base with industry and the economy.

In February SBS organised a one-day Symposium on "Bridging the Gap"—the problems of financing hi-tech start-ups—sponsored jointly with the DTI and NatWest.

A copy of our "Policies for the Next Government: Science and Technology" is also enclosed.

7 November 1997

WEDNESDAY 12 NOVEMBER 1997

Members present:

Dr Michael Clark, in the Chair

Mr David Atkinson
Mr Nigel Beard
Dr Ian Gibson
Dr Lynne Jones
Mr Nigel Jones
Dr Ashok Kumar
Mrs Caroline Spelman
Dr Desmond Turner
Dr Alan W Williams

Memorandum submitted by the Committee of Vice-Chancellors and Principals of the Universities of the United Kingdom (CVCP)

1. INTRODUCTION

1.1 The CVCP consists of the executive heads of all UK universities. In total there are 112 CVCP member institutions. The CVCP aims to promote understanding of the roles, achievements, needs and objectives of UK universities, including of course in the field of research. The CVCP works by formulating common views on matters affecting UK universities collectively.

2. SUMMARY: CVCP

- believes that well-funded research—of all types, from basic to strategic and applied—must be an integral part of any "compact" between the university sector, Government and society;
- urges the Government to address the research funding gap (see below paragraph 4.1) so that UK unversities' reputation for research excellence can be maintained in a highly competitive international environment;
- strongly supports the Dearing Committee's recommendation to Government that, with immediate effect, projects and programmes funded by the Research Councils should meet the full indirect costs and the costs of premises and central computing, through the provision of *additional* resources (Dearing Report, Summary, recommendation 34, paragraph 56, page 22);
- urges Government to meet an additional shortfall of £474 million in research equipment funding (see below paragraph 4.2);
- supports the principle underpinning Dearing recommendation 34 to encourage opting out of the Research Assessment Exercise (RAE) but not the creation of a non-competitive funding stream;
- believes that all public funding for research must be allocated on a competitive and accountable basis;
- advocates a second competitive funding stream to support high quality work which it would not be appropriate to enter in the RAE;
- supports the present level of selectivity in research funding as broadly acceptable;
- argues that the funds provided for *teaching* should cover the costs of academic work which nurtures a scholarly approach;
- supports the proposal for an Industrial Partnership Development Fund (IPDF) for research which contributes to regional and economic development;
- supports the creation of a joint public/private loan fund to support research infrastructure;
- offers qualified support for a revolving loan scheme based on public funds for the purpose of encouraging collaboration in research;
- emphasises the need for the barriers to collaboration in the funding and assessment methods to be removed;
- strongly endorses Dearing's proposal to establish an Arts and Humanities Research Council with additional funding in the order of £25 million per year;
- supports the recommendation to establish an independent advisory body; and
- supports the need for increased investment to maintain/develop high speed national networks and improve international connectivity which are vital to research in universities.

3. University Research

3.1 University research is a crucial national asset. It contributes to economic growth at local and regional level and helps the nation to remain competitive in global markets. It advances knowledge on matters of vital public concern such as health, education and the environment. Well-funded research—all types, from basic to strategic and applied—must therefore be an integral part of any "compact" between the university sector, Government and society at large. The Dearing Report provides evidence of the research funding gap which must be addressed if this reputation for excellence is to be maintained in a highly competitive international environment.

4. Indirect Costs of Research

4.1 Dearing recommendation 34 to Government that, with immediate effect, projects and programmes funded by the Research Councils should meet the full indirect costs and the costs of premises and central computing, through the provision of *additional* resources, has our firm support. The Dearing Committee estimated that the Research Councils need an additional £110 million to cover the full indirect costs of their projects. While it is vital that this sum be found in the current spending review, in our view it represents a serious underestimate. In evidence to Dearing, CVCP estimated that the shortfall approached £530 million (Our universities, Our future, CVCP evidence to the Dearing Inquiry, October 1996). We share the Dearing Committee's view that universities have an obligation to ensure that staff are fully aware of the costs of research; we will work with the sector to spread good practice.

4.2 While it is vitally important to address the recurrent funding gap—as recommendation 34 seeks to do—CVCP wishes to stress the serious difficulties experienced by universities because of the shortfall in research equipment funding. An independent report published in June 1996 estimated a shortfall of £474 million to bring priority items of equipment only up to date (Survey of Research Equipment in UK universities—PREST and CASR, University of Manchester). The report found that over one-fifth of research equipment in research intensive universities is over 15 years old and 13 per cent inoperable or in poor condition. Sixty per cent of all stock has a remaining useful life of five years or less.

5. Research Assessment

5.1 We support the principle underpinning Dearing recommendation 34 to encourage opting out of the Research Assessment Exercise (RAE). To give effect to this, Dearing proposes "non-competitive funding to support research and scholarship that underpins teaching". We have reservations about this and propose a different mechanism.

6. Funding for New Research

6.1 In our view all research funding must be allocated on a competitive and accountable basis. In the present highly selective funding system there is a risk that the emergence of new research talent and the development of research expertise by small groups and in new subjects will not receive sufficient encouragement. Research capacity at the developmental and applied end of the research spectrum must be sustained in order to encourage a vibrant economy and to assist local and regional competitiveness. We therefore advocate a second competitive funding stream to support high quality work which it would not be appropriate to enter in the research assessment exercise.

6.2 High quality research must be nurtured wherever it is found; the present level of selectivity in research funding is broadly acceptable and we do not wish to see an over-concentration of research in too few universities. The Dearing Committee argued that research rated at 3a or above should continue to receive QR funds from the funding councils. We agree. Our calculations suggest that the amount available for departments below 3a in 1996, together with non-formula and analogous research funding, was in the order of £54 million. This provides an indication of the appropriate scale of the second competitive funding stream which we propose.

7. Funding for Scholarly Teaching

7.1 The Dearing Report proposes a per capita sum for "research and scholarship which underpins teaching". In our view, the funds provided for *teaching* should cover the costs of academic work which nurtures a scholarly approach—ensuring that up to date and authoritative knowledge is imparted to students in a stimulating way, drawing on an understanding of effective learning methodologies. This should apply to all departments, whether or not they are selectively funded for research. The Committee of Inquiry was convinced that "scholarly investigation, together with research, is a distinctive feature of higher education". We have therefore proposed a significant enhancement in the unit of resource for teaching. In our view this is a better way forward and preferable to a mechanism for "opting out" of the research assessment exercise.

8. Industrial Partnership Development Fund

8.1 Like the Dearing Committee, we are convinced of the value of strong partnership between higher education and industry. We support the proposal for an Industrial Partnership Development Fund (IPDF) for research which contributes to regional and economic development. The higher education sector wishes to be fully involved in establishing the Fund and its *modus operandi.*

9. Joint Public/Private Loan Fund to Support Research Infrastructure

9.1 This recommendation, for a revolving loan fund of £400 to £500 million, is part of Dearing's package of measures (recommendation 34) to address the serious infrastructure funding problems which the Inquiry rightly identified. We support the recommendation and urge the Government to "promote and enable" the creation of this fund, as the Report advises. In our discussions with employer representatives on the proposal for the IPDF, we shall also seek their support for the revolving loan fund.

10. Revolving Loan Scheme Based on Public Funds

10.1 The Dearing inquiry has recommeded additional "revolving loan schemes" based on public funds, to address three distinct purposes. One of these is to fund collaborative projects to facilitate access to teaching and research facilities which would not otherwise be viable. We support the proposal for this limited purpose, which is in line with CVCP's recommendations to the Inquiry on the subject of collaboration. We urge caution on the remainder of the recommendation. Until the current gap in infrastructure funding is rectified there can be little added value in top-slicing for the additional purposes outlined.

11. Arts and Humanities Research Council

11.1 This recommendation (Dearing Report, Summary, paragraph 59, page 22) has our strong support, with the proviso that—as the Dearing Report indicates—it will require additional funding in the order of £25 million per year in order to succeed. We pressed the case for such a Council and welcome this recognition of the status and funding needs of humanities and arts research. CVCP's preference is for the Council to operate under the aegis of the proposed independent advisory body.

12. Support for Collaboration

12.1 Under this recommendation, funding bodies are urged "to use their funds on a revolving basis, bringing forward and offsetting annual allocations in support of collaboration". We interpret this as a measure to assist universities with the initial costs of collaborative ventures—a need which can be substantial. The recommendation has our support.

12.2 There is a need to go beyond this. The current funding and assessment methodologies for research act as disincentives to collaboration and adjustments need to be made to ensure that the existing barriers are removed.

12.3 In view of CVCP's advocacy of collaboration to encourage complementary provision and the effective use of resources, we will wish to link the Dearing Committee's strong support for increased cooperation and partnership with the recommendation for a public/private loan fund for infrastructure. The Dearing Report argues that departments which have been selectively funded for research have an obligation "to provide reasonable access and support to committed and qualified individuals from other institutions" (*paragraph 11.96.*). CVCP will explore with the sector and with the funding councils how this objective can best be achieved.

13. Independent Advisory Body

13.1 We support this recommendation and will be pleased to make an input to Government on the composition and remit of the new body. We note the recommendation that it should operate "above the interplay of departmental interests" with direct access to the Prime Minister, in a similar way to the former Advisory Councils on Science and Technology (ACOST) and on Applied Research and Development (ACARD).

13.2 The Dearing Committee established a set of principles against which future research arrangements should be judged, including: adequate funding for infrastructure to support high quality research and training; that excellence should be funded, wherever located; and that research selected for support must be fully funded. We commend these principles to the new advisory body.

14. IT NETWORKS

14.1 The CVCP supports the need for further investment to maintain and improve the high speed national IT network and to improve international connectivity. International lines are now seriously congested. Links to Europe and especially the USA are usually fully loaded and often unusable at peak times, causing difficulties for the research community. The impact of these constraints and future investment needs are specified in the Joint DfEE/HE Sector Working Party report to the Secretary of State on *Information Technology in Higher Education* (July 1997).

22 October 1997

Supplementary Memorandum submitted by the Committee of Vice Chancellors and Principals of the Universities of the United Kingdom

LETTER TO THE CLERK OF THE COMMITTEE FROM LUCY BURNS THE GOVERNMENT AND PARLIAMENTARY RELATIONS MANAGER

On the subject of the research infrastructure shortfall, estimated by Dearing to be around £110 million, CVCP did indeed suggest a much higher figure (around £530 million) in evidence to the Dearing Inquiry.

I have attached the calculations on which this sum is based. However, we would stress that all such figures are estimates based on broad assumptions. CVCP is firmly of the view that the Dearing figure is an under-estimate. We understand that a study, based on specific university examples, using a robust methodology is under discussion and likely to be contracted soon.

12 November 1997

RESEARCH FUNDING GAP—1994–95, UK HIGHER EDUCATION

A. TOTAL HEFC INCOME FOR RESEARCH

£ million
775

B. INFRASTRUCTURE FOR EXTERNALLY FUNDED RESEARCH

	Total external income	*Provision for indirect costs*	*@% of Direct Staff Costs*	*100% Indirect Costs*	*Indirect Costs Gap*
Specific Income for research					
Research Councils	497	96	40	240	144
Charities	313	18	10	177	159
EU Sources	145	24	33	73	48
UK Government, etc	244				
UK Industry	158	96	40	241	145
Other	96				
Total	1453	234		731	496

Therefore, the total remaining from HEFC grant for research after paying for the infrastructure for externally funded research = £279 million

ASSUMPTIONS

1. Direct staff costs = 60% of total direct costs
2. Indirect cost provision by Research Councils = 40% of direct staff costs
3. Indirect cost provision by charities = 10% of direct staff costs
4. Indirect cost provision by EU = 33% of direct staff costs
5. Indirect cost provision by industry, Government and other sponsors = 40% of direct staff costs
6. Full indirect costs = 100% of direct staff costs

C. CONTRIBUTION FROM HEFC FUNDS TO POSTGRADUATE RESEARCH TRAINING

Say, £50 million

D. PROVISION FROM HEFC FUNDS FOR RESEARCH ACADEMIC STAFF PAYROLL COSTS AND ASSOCIATED INDIRECT COSTS

Assume 40,000 staff spending an average 25% of their time on research at an annual average payroll cost of £34,000 (including NI and superannuation) = £8,500 each.

Therefore, total = £340 million; plus 100% for indirect costs (libraries, computing, administration and other general support for research).

Overall total = £680 million

E. HEFC MARGIN OF FUNDING FOR INNOVATIVE OR SPECULATIVE BASIC RESEARCH

Say, 5% of total spent from external sources. Therefore, £75 million.

F. TOTAL REQUIRED FROM HEFCs IS THEREFORE

	£ million
B. Infrastructure for externally funded research	500
C. Contribution to postgraduate training	50
D. Contribution to research active academic staff salaries	680
E. Margin for innovative/speculative research	75
Total	**1305**
Less HEFC research funding for 1994–95	775
Therefore, the funding gap per annum at 1994–95 prices is:	**£ 530 million**

Note: These are CVCP estimates based on a number of broad assumptions.

Examination of Witnesses

PROFESSOR SIR GARETH ROBERTS, Vice-Chancellor, University of Sheffield, PROFESSOR RODERICK FLOUD, Provost, London Guildhall University, PROFESSOR GEORGE LUNT, Deputy Vice-Chancellor, University of Bath and DR MICHAEL GOLDSTEIN, Vice-Chancellor, Coventry University, Committee of Vice-Chancellors and Principals of the Universities of the United Kingdom, were examined.

Chairman

94. Professor Roberts, thank you very much for coming along this afternoon and bringing your colleagues with you. I am sorry to have kept you waiting six minutes but we had certain private business we had to conduct first of all. You are the lead spokesman I think this afternoon and we shall address questions to you but feel free to farm them out to your colleagues.

(*Professor Roberts*) Thank you.

95. I wonder if I could ask you to say a few words about the Committee of Vice-Chancellors and Principals and then perhaps you would kindly introduce your colleagues to us.

(*Professor Roberts*) Thank you very much indeed, Chairman. Thank you for giving CVCP an opportunity to contribute to this important topic. We do see university research as a crucial national asset in this country and beyond that just R&D in general. Perhaps in a minute of introduction, before mentioning who my colleagues are, I could say we are concerned overall at the amount of research and development in this country. We believe that there are these independent assessments now showing the UK is under-investing. I am on the board of the Defence Evaluation and Research Agency and I have seen over the last five years just how that R&D budget has gone down. That has a huge effect on industry, not just on universities. We saw the UK industrial R&D scoreboard two or three weeks back showing that despite our valiant efforts on Technology Foresight and so on, there does not seem to have been any increase in the R&D spend in British industry. The information given to you by the Save British Science people a week or so ago gives OECD data showing that the UK is under investing generally in research. Although we are here to talk about university research the backcloth is not very encouraging either. We had the Dearing Report, of course, identifying the funding gap that most academics knew was there. We now have that hard evidence. People might argue about what size that gap might be. In a meeting with John Battle last week

[**Chairman** *Cont*]

some of us had a good meeting with him where we promised to help him in the DTI and the OST to try and work out just what is the size of the funding gap that Dearing and others have referred to. I think it is important to point out that universities have responded extremely well to the various challenges thrown at them in the last few years, while there has been enormous change in the system. You will find that most of the research intensive universities now have a graduate school to cut across departments and encourage multi-discipline activity. You will find that the medical schools have been totally revamped in order to cope with the surge of interest in neurology and genetics and the like. In order to cope with the European money from Brussels most universities have a European bureau now and we are very conscious of the fact that—

96. Many of these things will come out in questioning Professor Roberts. I wonder if you would mind—we are terribly pressed for time, we have three lots of witnesses this afternoon—quite a lot of this will come out in dialogue.

(*Professor Roberts*) Let me introduce my colleagues at least.

97. Of course.

(*Professor Roberts*) Otherwise I will be very discourteous. We have 104 vice-chancellors now and just like 104 politicians or 104 business people we do not always agree on everything. What I think we will be conveying to you this afternoon is where the peak of that distribution of views is coming from. We have a range of vice-chancellors from different types of universities. Roderick Floud is from the University of London Guildhall and he is more on the humanities side. We have Professor George Lunt from the University of Bath which is an old new university, a research intensive one. We have Michael Goldstein who is a physical scientist from the University of Coventry. I am from Sheffield University myself, one of the big research ones. Thank you for allowing us that introduction.

98. Thank you very much indeed, Professor Roberts. Perhaps I could ask you the first question and go straight into the funding that has been talked about. Can I start by thanking your organisation for a letter received faxed to us only this morning from Lucy Burns, your Government and Parliamentary Relations Manager, that sets out why it is that your organisation thinks there will be a disparity between the estimate of the amount of money needed to allow the research councils to fund fully projects. You are saying £530 million even though the Dearing Report said £110 million. We thank you for the detail of where the £530 comes from but could you give me a brief idea as to why there is such a big difference between your £530 and Dearing's £110? Why do you think he thought it was so little?

(*Professor Roberts*) The £530 million that we mentioned, as the table will show, covers more than just research council income. The overhead that we receive in the universities varies considerably. The charities on average might give us a ten per cent overhead and in some cases it is zero. We have assumed that perhaps ten per cent is what Wellcome or the British Heart Foundation might provide for us. European funding is normally a 20 per cent overhead. The research councils' used to be 40, now it is 45 per cent. Industry is very variable and so that might be 20 or 30 per cent. It does depend a lot on how you average these figures. We believe that a true overhead is much nearer the 100 per cent mark. I think Dearing calculated his figure on the basis of the gap in the research council overhead. I think our figure covers all the other types of research income we receive.

99. You would not think it would be the difference between a giver and a receiver, would you? In other words Dearing might see himself as linked to Government and therefore the donator of money and you are the receivers of money and it is the different perspective of a giver and a receiver?

(*Professor Roberts*) There may be an element of that but I think hopefully this investigation that the OST is going to conduct will clarify just what those figures are. Whatever it is, it is several hundreds of millions of pounds.

100. It is a factor of five anyway. Can I just ask you: if the current pattern and level of research council funding is maintained and Dearing's proposals regarding indirect costs are not adopted, what effect will that have on research?

(*Professor Roberts*) The CVCP has come out very firmly saying that in that case we would have to reduce the number of projects. We would far prefer to see a properly costed, fully-funded project coming through from the research council than trying to keep the status quo.

Chairman: That is very succinct, thank you very much indeed. Dr Jones?

Dr Jones

101. The CVCP has welcomed the Government's initial injection of £125 million direct into the universities and yet it is still unclear what is going to happen in future years. As you know that has largely been obtained by slipping the third term of loans into the following financial year, which will mean there will be less money in the following year if additional money is not found. Does this concern you and what do you think should be done? What would be the impact if additional funding was not obtained?

(*Professor Roberts*) It is of massive concern to my colleagues here and everybody in CVCP. I think the tuition fee and the way the Labour Party are proposing now to fund higher education gives us some opportunity for the next century but not over the next three or four years—and we believe this is what Dearing tried to address—Dearing I think we saw as a short-term fix really, trying to cover for the fact there has been massive under investment in the last few years. The cuts we had in our capital were about 50 per cent and much of that was going to research. So we must remember this extra injection of money is just reducing the amount of money slightly less than we would have received. There are still massive cuts in the university sector. I think the latest figures show that half the universities are forecasting very large deficits this year.

102. What will you be looking for in 1999 and 2000?

[Dr Jones *Cont*]

(*Professor Roberts*) I think again we have come out very firmly saying that we believe we can manage a one per cent efficiency gain. At the moment the efficiency gain for 1999/2000 is four and a half per cent. With the way inflation is running now, in fact, it is nearer probably five and a half or six per cent. I just do not think universities can handle that sort of cut.

Dr Gibson

103. Another aspect to this problem is the research equipment and infrastructure, of course, and you indicated the serious difficulties in that area. Do you think that the Dearing proposals for a revolving loans fund of £400 to £500 million would be adequate to meet the shortfall?

(*Professor Roberts*) Again I do not have the answers but I have been present at a CBI meeting with some very distinguished leaders of industry there, people like Sir Richard Sykes. They have said that there is no way they can see their companies joining in Dearing's plan in this way. I think the only way I can see a modified version of that would be if maybe a group of six blue chip companies, let us say, decides to focus on, say, the University of Sheffield and decide: "We will act as guardians for you and support you". I think trying to say: "Here is a general fund for all universities" I do not see industry backing that at all.

104. Suppose it did happen, what about interest repayments? What would happen there from the university's point of view if the loan scheme did function?

(*Professor Roberts*) Most large universities have no difficulty finding funds that will support their work for teaching or research but as long as there is that huge efficiency gain being built into the system we will not be able to afford the recurrent costs involved in servicing the loan. It is not a true lasting solution to the problem.

105. Save British Science described it as implausible and frankly you might go further than that?

(*Professor Roberts*) Yes. I cannot even think of the Welsh extreme word for it.

Dr Jones

106. But Richard Sykes was a member of the Dearing Committee. Why did he support it in the first instance?

(*Professor Roberts*) Sir Ron Oxbrugh, one of our vice-chancellors, was on the Dearing Committee and I heard him speak at a symposium last week. He believes that that perhaps was not the best part of the Dearing Report. There was not a lot of agreement on that particular section.

Mrs Spelman

107. I want to put a question to Professor Floud on the Arts and Humanities Research Council. Dearing proposes the creation of this. Assuming that new money would not be available for an Arts and Humanities Research Council, would you favour a transfer of funds from the funding bodies, other research councils or the Humanities Research Board?

(*Professor Floud*) First, can I say the CVCP is very much in favour of the creation of an Arts and Humanities Research Council but does believe that additional funding is required. Currently the level of support for the arts and humanities, and of course that is not just the traditional humanities but also art and design and the cultural industries generally, is very much lower than is given to either the social sciences or the other parts of the science base. We believe an investment in further research in arts and humanities would be very productive for the country as a whole. I think different people would have different views about where money should come from if there is no additional money. It is quite clear that the full funds of the Humanities Research Board currently devoted to research, both to studentship and to a very small—only two or three million—research programme would be the first stage of that but we believe in order to fund arts and humanities researchers at a level only equivalent to about 90 per cent of social scientists does require an additional £25 million. Now, where that comes from it seems to us is a matter for Government but we believe certainly it is necessary.

108. Going on from that, the CVCP argued that the Arts and Humanities Research Council should be part of the structure of the OST. Why do you think it is appropriate and why should it not be part of another Government department that has closer links with the arts and humanities?

(*Professor Floud*) I think because we feel that there has been a tendency to marginalise research in the arts and humanities anyway. The failure of the previous Government to establish, despite the very considerable urgings, a research council in this field when it was making all the changes to the other research councils earlier in the decade I think illustrates that marginalisation. If you keep the structure separate from the OST then I think you are likely to get further marginalisation. I would believe as a social scientist, or rather a mixture between the humanities and social scientists, that the arts and humanities do have a very strong role to play in the promotion of economic welfare, the culture of this country and so on and therefore you should see it all as part of the overall science base. Of course in most European countries most of the people would be regarded as scientists.

109. What implications would this have for the post of Director-General of the Research Councils? Could you envisage a non-scientist in the post or would the arts and humanities community be content to see a scientist permanently in charge?

(*Professor Floud*) I think speaking entirely personally I would believe there are many people in the arts and humanities who have a sufficient grasp of these issues to hold a post like Director-General of the Research Councils but I think realistically one would not expect that, no. It seems to me the major spending is in the natural sciences, engineering and so on, and one would expect the Director-General to be in that field. Nevertheless one would hope that we are not any longer so much in the situation of the two

[**Mrs Spelman** *Cont*]
cultures and that somebody holding that post would be concerned also about the future of the arts and humanities.

Dr Williams

110. Can I ask very briefly—I am sympathetic to the idea of the Arts and Humanities Research Council but I would find it very strange for that to be in the Office of Science and Technology - would it not more properly fit into National Heritage, that department?

(*Professor Floud*) I think you can always make arguments about where bodies should go and you could possibly make the same argument that the ESRC should report to the Treasury. Of course there are links between the arts and humanities and the museum world and the other responsibilities of that area but there are very substantial links also, for example, with the Department of Trade and Industry through its promotion of design and technology. It seems to me the whole area of the arts—leaving aside perhaps the traditional humanities—is an extremely important export and industry and part of the productive capacity of the country. Therefore, putting that within the OST, within the DTI, is perfectly appropriate.

Dr Turner

111. Can I ask a quick supplementary, if I may. Do you not think that if you had an Arts and Humanities Board within the OST essentially on the face of it competing with the scientific research councils you would be setting up a rather non-creative tension?

(*Professor Floud*) I do not think that has been the experience with the Economic and Social Research Council. I have just ceased to be a member of the ESRC after four years on that council. I think the experience during that whole period was that the co-operation that was achieved between the chief executive and the chief executives of the other research councils and the work that was undertaken with the Director-General of the Research Councils was actually extremely productive. I think the ESRC's promotion of thematic research priorities was wholly supported by the Director-General and has been accepted now by the community as being extremely sensible. There has been a whole range of other co-operative measures. I think if you did have the Arts and Humanities Research Council under the OST, under the Director-General, then it would be possible to promote co-operation between the different activities which I think would be to the good of us all.

Chairman

112. From the chair, Professor Floud, can I just check with you that you are suggesting that the Arts and Humanities Research Council could be part of OST but it would bring with it a new budget? There is no attempt by arts and humanities to muscle in on existing budgets and take some away from existing science research, is there? I think you made that quite clear to Mrs Spelman. That is correct, is it not?

(*Professor Floud*) That is so, yes.

Mr Beard

113. Can I go back to the earlier discussion on overheads? Professor Roberts, you mentioned you thought the answer was nearer 100 per cent than the 10 or 15 which had been quoted. Are the accounting procedures in the universities that the CVCP represents adequate to identify what these overheads are for individual projects?

(*Professor Roberts*) They are indeed. I cannot speak with authority for all the other universities but in my own, I used to be a director of Thorn-EMI, the procedures there are just as tight as they were in industry. The problem is that overheads do vary a great deal. Should the overheads be on the direct staff costs or should they cover the whole of the grant? If you suddenly acquire a one million pound microscope at the present time you get no overhead on that and yet the cost of plumbing it in and providing the services, the infrastructure, are enormous. It does vary greatly from one project to another just what the overhead should be. Therefore a move towards fully costing a project, whether the money comes from the research council or Europe, has to be the way forward.

114. The Dearing Report put forward proposals for non-competitive funding for research and scholarship that underpins teaching. Your evidence expresses reservations about this. What are the reservations?

(*Professor Roberts*) Perhaps I could ask my colleague, Michael Goldstein, to comment on that.

(*Dr Goldstein*) I think that the importance of scholarship should permeate, and indeed does permeate, the whole range of work in the university. To see scholarship as an alternative to research does not seem to be the best way to fund scholarship or indeed to encourage research in those areas that are not perhaps at that particular point in time at the higher echelons of research. I think we see a very clear need to encourage research, wherever it might be and wherever there is excellence, wherever there is potential, so you can develop new areas for people but that scholarship is something rather different. Dearing does not define scholarship but I think in common parlance we would see that as not being an alternative to research but something which runs alongside it.

(*Professor Roberts*) If I could just expand a little on that. I think Dearing has suggested this £500 per head award, whatever the sum might be, but what we would prefer I think is to have a second competitive fund for research for those departments which have not been returned in the Research Assessment Exercise. You might have a research group in the university department that has not been returned but nonetheless it has received money from the Department of Health, industry, a research council and what we could do then is to say: "Okay, somebody outside the university has given you a kite mark indicating that you are doing some useful research; you are qualified now to apply to another purse for research". We believe all that money in the funding council pocket for research should be spent on research.

[**Mr Beard** *Cont*]

115. Dearing's view was slightly different from that, was it not? Dearing's view was that this scholarship money should go to enhance the teaching side of a university's activity. It was more scholarship in the sense of knowledge derived from research and information already in existence rather than new knowledge.

(*Professor Roberts*) There were two motives, I think. One was that, the other was to try and streamline the Research Assessment Exercise. I think there are other ways of streamlining the RAE rather than the one Dearing has suggested.

116. What would you say those are?

(*Professor Roberts*) I think one needs to think very hard about should every department submit an application or not? The Funding Council for England, which I am on, has just produced a very interesting consultative paper on this issue. You may say to a department that is graded four, for example, "You will receive next time around 90 per cent of the money, rather than the full amount, unless you put in an application". We could be saying also to people, "Let us not have the big bang exercise every five years, let us decide, we will cover the physical sciences one year, the biological sciences the next". There are various ways of reducing that scale of effort.

Mr Jones

117. Is the distinction made between basic, laboratory-based research to a level of national excellence, public research, and scholarship, private research, one that it is possible to make in terms of research funding? We had Sir John Cadogan with us last week and his view was that such a distinction is merely "a play on words". How do you respond to that?

(*Professor Roberts*) While I am giving George Lunt time to think, if I could just say there is that very, very broad spectrum, obviously, from basic to strategic and applied research. In industry I do sometimes think that research is defined as development done slowly. There are different attitudes to research. I believe in the whole mix in my institution. In most universities you will find in many departments that whole spread. I think John Cadogan is right, I think it is important that applied research is underpinned by good basic research. What you want I think, irrespective of what kind of research you are doing, is for somebody else to be waiting on the result that you will be producing. It does not matter if it is very scholarly research or if it is very applied research, you should ask yourself, is the work I am doing of real value, is somebody else out there interested in the result?

(*Professor Lunt*) It is a difficult distinction to make, certainly in my own university, which is a university that has its origins in science and technology and particularly values its close association with industry and with business. A lot of the work going on in Bath is of an applied nature directly in association with the real world outside, as it were. Certainly I am very conscious of the fact a number of colleagues in a variety of different departments around the university feel that sometimes their research is not valued as highly as that of colleagues who are funded by the research councils or by the major charities, for example. It is very difficult to make that distinction and I think from the point of view of the platform on which we base our teaching at both under-graduate and post-graduate level, it is important that we do have that mix and that we do not try to make a distinction between pure research and applied research. I think we have been encouraged in the move in the RAE exercise, for example, to give rather more credit for so-called applied research than for pure research. There are areas where we see staff who are essentially practitioners in the areas in which they are working. We have a school of architecture and there are very successful practitioners in that school of architecture. They are not doing research in the very narrowly-defined academic definition of research but they are respected practitioners who are influencing the way in which their discipline is developing; they are attracting the attention of their peers and their customers outside. That sort of work is every bit as valuable and as important as the pure academic research. We have to have a mix and we should not try to make sharp divisions.

(*Professor Roberts*) You will find in most universities now a promotion criterion mentioning standing in the profession and not just research, that is, the usefulness of that person, his or her creativity applied in the real world.

Chairman

118. Before I call Dr Kumar, I wonder if I could ask Professor Lunt if he recalls the words of Lord Porter, who was Sir George Porter, when he said on one occasion: "There are only two types of science, applied science and still waiting to be applied science". I think you have described that situation.

(*Professor Lunt*) Yes, indeed.

Dr Kumar

119. The Dearing Report proposes the creation of an Industrial Partnership Development Fund. Now, if this fund is to be successful will new money be required or is it enough to divert funds from current schemes promoting the interaction between industry and higher education institutions as Dearing has envisaged?

(*Professor Roberts*) CVCP has come out very firmly in favour of this type of fund. It does believe, I think, that there has been too much competition in the academic world and the time has come for partnership. You will find now I think strategic alliances being the name of the game. In regions like my own in Yorkshire and Humberside where we have had Objective 2 money you will find all universities collaborating, you will find really strong university/industry links, and so a lot of DTI money and Department of Environment money is going into forging some excellent partnerships. In other parts of the UK where you do not have the benefits of accessing the ERDF money, that has not happened. I do believe if we can have a specialist fund which does integrate and pull together the different incomes from the DFEE and the DTI you will find universities responding very, very quickly to that and forming some excellent partnerships.

Dr Jones

120. How do you envisage this funding will be disbursed if it is not going to be on a competitive basis?

(*Professor Roberts*) I would assume that the new Regional Development Agencies will have some influence on this. Again, I do not want to push my region too much but all the universities now have formed a partnership. We have a company now, Yorkshire and Humberside Universities Association company. When certain opportunities come for attracting European money or industrial money we have a vehicle, a mechanism, for quickly getting a partnership together and getting some real gearing for the money that the DTI and others are putting in.

Dr Williams

121. I am pleased to hear of the development and the progress being made in that regard. It has been said earlier about the lack of enthusiasm for the loan fund. Anyway, looking globally at the contribution by industry to research in higher education, I am quite disappointed by the global total. I have figures here of £157 million from UK industry into the total budget of £2.5 billion, only about six per cent of higher education research resources coming from universities. Should it not be very much more and a much stronger tie-up in the sense you have just mentioned with that development partnership fund?

(*Professor Roberts*) The answer is yes, of course, but everything is relative in this world. When I was Chairman of CVCP I had the opportunity of going to Europe a lot. I was delighted to see that Britain is ahead of the game when it comes to university/industry interactions. When you look at this on a percentage basis it is only the United States' industries that invest more percentage-wise than the UK industries.

122. In Germany there are Max Planck and Fraunhofer and Steinbeis; there is a much closer integration in the third-tier element. They have institutes we have not got in this country. Their total contribution is probably very much more than ours.

(*Professor Roberts*) Yes. We have talked about Fraunhofer centres, Faraday centres in this country and there is still a lot more that can be done in that direction.

Chairman

123. Thank you, Professor Roberts. Our time is virtually up. Can I just ask one quick question to finish off. The industrial partnership that has been talked about by Dr Kumar; if that was to come about would you see that as being financed by new money or by taking money from existing allocated budgets?

(*Professor Roberts*) I think some additional money is valuable simply to pump prime. The gearing that has been produced in Yorkshire and Humberside on money brought in from other sources has been enormous. Having an extra pot of money is an incentive for people, however small it is. I think it encourages partnerships; so I would say additional monies but not necessarily a large pot.

124. You are talking about Dearing gearing!

(*Professor Roberts*) Indeed, yes.

125. I am so sorry this has been so brief, the alterative is not to call as many witnesses. We would rather have you for a short period of time than not at all and I hope you feel the same way. We do feel we have been a little bit rude to you because it was such a short period but we hope you understand. Thank you, all four, for your very kind and helpful contribution to our inquiry.

(*Professor Roberts*) Thank you.

Memorandum submitted by the Association of the British Pharmaceutical Industry

Thank you for your letter of 2 October inviting the Association to submit a memorandum putting forward our views on the implications of the "Dearing Report" for the structure and funding of university research. The Association has recently responded to the DfEE, putting forward our detailed comments on certain elements of the report of the National Committee. A copy of our formal response to the consultation is attached *in toto*.

The Association notes that the Science and Technology Committee will be focussing its inquiry into the implications of the recommendations of the report for research in higher education institutions. The Association recognises that the report of the National Committee has addressed a wide range of important issues concerning the role, funding and purpose of higher education. However, in our submission to the Government on the report the Association has chosen to restrict our detailed comments on those aspects which, we believe, impinge upon the R&D operations of the pharmaceutical industry.

We consider that many of the topics to be considered by the Science and Technology Committee have been addressed in our formal submission. We would be pleased however to provide the Committee with clarification of further information on any of the points we have raised.

The Association would like to bring to the Committee's attention a number of key issues covered in our report:

(i) The importance of the UK pharmaceutical industry to the economic well-being and health of the UK, the excellent interactions that take place between companies and higher education institutions (HEI) in the sector, and the fact that the continued success of the industry here is dependent on excellence in research and development and a strong academic science base in the UK.

(ii) Our appreciation that the Dearing Report has clearly recognised that there is a major crisis in the research infrastructure of higher education institutions (HEIs) and that this needs to be resolved as a matter of some urgency. Whilst the report does emphasise the need for greater prioritisation, greater selectivity, more concentration of funding and an increased focus on excellence—pragmatic, essential and necessary objectives for the longer term in view of an increasingly limited overall budget for the science base—we are concerned that no realistic proposals have been put forward to deal in the immediate term with the current crisis in funding.

The proposal to establish a rolling loan funding scheme with industry input, to provide for equipment and infrastructual support, is not considered by the ABPI to be a way forward.

(iii) The Association recognises the need for increased diversity in the higher education system, but we feel that it is also essential for quality to be maintained.

Universities do need to ensure that the training given to graduates and postgraduates in science based courses has some relevance to the needs of appropriate industry sectors. We emphasise the need for students to become more flexible in their approach to employment, both in the industry and in any further academic career they chose to follow. Research departments, particularly in the biomedical sciences, in universities, and in companies (both large pharmaceutical organisation and SMEs) are becoming increasingly multidisciplinary and interdisciplinary, with a greater focus on emerging technologies (eg informatics, human genetics, developmental biology etc). Graduates and postgraduates must be trained appropriately to cope with the rapidly changing environment. With the changing nature of employment, the ABPI agrees that the development of life-long learning-based professional skills is now essential.

The Association hopes that the Science and Technology Committee finds these comments to be of assistance as it begins its inquiry.

28 October 1997

Annex

Response of the Association of The British Pharmaceutical Industry to the Report of The National Inquiry Into Higher Education

1. GENERAL OVERVIEW

The ABPI welcomes the long-awaited report of the National Committee of Inquiry into Higher Education. We acknowledge that the report will set the agenda for any future discussions on the role, funding and purpose of higher education over the next decade, and we hope therefore, that a number of its recommendations will be given further serious consideration and implemented. We believe that the National Committee has done an excellent job in identifying and commenting on the key issues affecting the whole Higher Education (HE) sector, and funding of Higher Education Institutions (HEIs).

We welcome recognition, within the review, of the importance to maintain diversity in the HE system. Also, the focus on issues such as life-long learning, the importance of continuous professional development, and the need for the maintenance of an effective qualifications framework is welcomed by the pharmaceutical industry.

The Association certainly welcomes the explicit recognition that there is a major crisis in the research infrastructure of HEIs. We are disappointed however, that it appears that no clear solutions have been found to deal with this immediate funding problem affecting the infrastructure of universities. Nevertheless a number of the recommendations concerning HE infrastructure, including the proposed changes as to how indirect costs of research should be managed and accounted for, the apparent move towards increased selectivity in funding, and the encouragement of universities to collaborate more in the use of equipment will, we believe, if implemented could have both some limited short-term and longer-term benefits.

The implications of the proposals to encourage some university departments to opt-out of the Research Assessment Exercise, and to focus their resources into teaching and scholarship will, we suggest, need to be considered further before being implemented. Any proposal, however, that will help lead to an increase in world-class research in the UK, and make full use of limited resources must be welcomed. The pharmaceutical industry looks to the higher education system to, *inter alia,* carry out high quality research and effective high-level teaching, to provide novel scientific information and knowledgeable well trained graduates. We recognise that some HE departments are good at teaching, others good at research, and some good at both.

The industry has long acknowledged that in the absence of any increased funding the concentration of finite resources is necessary. The National Committee of Inquiry has embraced the reality of this situation, and appears to have made a number of pragmatic proposals.

In our response to the report we have commented on the proposal that a "rolling loan fund" be established for the provision of equipment and infrastructural support to centres of research excellence. We consider it most unlikely that the pharmaceutical industry would wish to contribute to this £500 million loan scheme, which we understand, would expect to receive contributions from research councils, charities and other sectors. The pharmaceutical industry already funds a wide range of collaborative and contract research projects in academia, many of which involve a considerable financial contribution towards the purchase of equipment and infrastructure support etc. The pharmaceutical industry can ony support a certain level of external collaborations, and will do so only where it can see, and justify, the benefits of such collaborations. The pharmaceutical industry considers that the need to improve the fabric of the higher education sector is, and has been, for some time a key priority for the country, but we firmly consider it to be the government's role, not industry's to maintain the infrastructure of academia.

The pharmaceutical industry is pleased to note that one of the recommendations of the inquiry is the need for increased quality control in the provision of degrees to graduates. The variability in quality of the output of the universities has long been an issue of concern to the industry and we welcome the proposed changes.

We also welcome the recognition, by the National Committee, that whilst access to higher education has to be, quite rightly, facilitated and broadened, excellence in the UK has to be maintained and nurtured.

2. THE UK PHARMACEUTICAL INDUSTRY NEEDS FOR EDUCATION AND TRAINING

The Association of the British Pharmaceutical Industry (ABPI) represents companies in Britain that research, develop, manufacture and market prescription medicines. It also has other members drawn from organisations with an interest in the pharmaceutical industry operating in the UK.

Member companies of the ABPI supply more than 90 per cent of the prescription medicines taken up by the NHS. The industry invests more than £2 billion a year in research and development, nearly a quarter of all industrial R&D in the UK. Five out of the world's top 20 prescription medicines were discovered and developed in UK laboratories. Export figures for the pharmaceutical industry achieved a record £5.4 billion in 1996, resulting in a surplus with our trade partners of £2.3 billion.

The pharmaceutical industry is the second largest net contributor to the UK's balance of payments. Its products are of benefit to the health of not only the UK population, but also the world at large, The success of the pharmaceutical industry also creates a range of employment opportunities. There are approximately 80,000 people, a high percentage of which are graduates, employed directly by pharmaceutical companies and around 250,000 others in supplier organisations. The UK pharmaceutical industry is recognised internationally for the quality and innovative research carried out in its laboratories.

The continued development of the industry's global competitiveness through improved standards of education and training is central to the country's economic well-being. The need for a well-trained and qualified work force to sustain this performance cannot be under-rated.

The pharmaceutical industry requires a wide range of skills, including people with expertise in the manufacturing, research, development, medical, clinical, legal, sales and marketing areas, plus support/service staff.

The pharmaceutical industry relies on and encourages:

- high academic standards in research and development and in clinical areas;
- quality training in the workplace;
- effective management of the supply chain;
- high manufacturing standards; and
- commercial skills.

The ABPI strives to play a strategic role in the development of training and education for the pharmaceutical sector. The ABPI is the Industry Training Organisation (ITO) for the industry sector. In future, it is intended that these activities will be achieved through the establishment of a National Training Organisation (NTO), to represent the pharmaceutical industry's specific interests and to act as a facilitator of best education and training practice throughout the sector.

In any consideration of the HE sector we believe that it is fundamental that changes taking place in the earlier education systems (5-16, 16-19 years) are taken into account. On the one hand it must be remembered that students make their decisions at schools on the attractiveness of future careers, and teaching in subjects such as science and maths really do need to be strengthened at that level. Also, in the light of changes which will be coming into force as a result of the Dearing Review of 16-19 Education, the new National Framework of qualifications will need to be recognised, understood and integrated into the current university recruitment/endorsement schemes. Much more support is needed in this area.

For many years the pharmaceutical industry has interacted extensively with academic research groups and recruits at graduate and postgraduate level. As a research-based industry we recognise the importance of a healthy research base in the HE sector as a source of innovative ideas and we also look to the HE sector to provide a pool of talent from which we can recruit trained scientists and technologists. We believe that a strong research base is essential to the training of specialist science graduates and that research and training are interdependent activities that must co-exist if HEIs are to produce the correct calibre of science graduates. Within this context, the Association has restricted its more detailed comments on the report to those areas which we believe impinge upon the research and development operations of the pharmaceutical industry.

We believe that the following recommendations require substantive response, and have added our comments after each.

3. Comments on Specific Recommendations

(a) Recommendations 18, 19: Work Experience

To increase the numbers of students getting work experience: Government should "encourage employers to offer more work experience opportunities".

We strongly support the idea of encourging students, both undergraduate and post-graduate, to obtain work experience. The industry has for many years offered a variety of work placements for undergraduates within the industry, and for post-graduates it has been active participants in schemes (of which CASE is one good example) that offer an opportunity for research students to work in an industry environment. In our experience there are various ways of offering work experience, each with a different "pay-off" for student and employer. Some companies offer work experience schemes for 14-18 year olds (2 week placements). Probably the most common are brief summer placements (around 8 weeks) which give students a short taste of the industrial research environment, and full sandwich-type placements. In the case of the latter, general opinion within the industry favours 1 year placements—a period that allows sufficient opportunity for the student to learn the necessary skills and allows the host company to obtain some benefit. The industry believes that those students spending time in industry should be carefully chosen to make full use of the opportunity. Those who have performed above a certain level or who have clearly identified a particular interest or aptitude should be considered for placement. Courses that address this issue properly are generally favoured by the industry.

Whilst the pharmaceutical industry is very supportive of the idea to increase students getting work experience, we doubt that companies have much additional capacity in the research and development areas. The limiting factors generally are the constraints on lack of space (and thus safety concerns) and the need to provide adequate supervision without seriously hindering the research activities of the staff member concerned.

The ABPI will continue to encourage our member companies to consider whether they could extend the placement opportunities available—not only in terms of numbers but also at different levels of HE—for example, placements for research students, postdoctoral researchers and more senior academics. In this context discussions are held on a regular basis with professional bodies to discuss the industry's current and likely future needs.

We appreciate that for students to find work experience in smaller, start-up biotechnology/hi-tech companies and other SMEs (small to medium sized enterprises) is more problematic. Some targeted financial incentive might encourage such SMEs to offer more placements.

(b) Recommendation 21: Course Programme Specifications

HEIs should develop "programme specifications" for courses, identifying stopping-off points and intended outcomes.

We fully endorse this recommendation, but would emphasise that there needs to be consistency across the academic sector. The ABPI will continue to consult with the industry in the identification of specific skills shortages eg bioinformatic experts, clinical pharmacologists, analytical chemists, whole animal pharmacologists etc, and will continue to press for improvements to the quality of students leaving present courses. We do not feel however that the industry should become directly involved in drafting specific programme specifications and accrediting such courses. However we do not think that the development of programme specifications should solely be an internal matter for HEIs and agree that they should be encouraged to discuss the course content with employers, particularly in professional disciplines where there are subject specific skills and where the changes in employers' needs are occurring at a fast rate. This is particularly the case in biomedical research where interdisciplinary skills are becoming increasingly important.

We will therefore encourage our members to be supportive, by working with local universities, Research Councils and with professional bodies (eg The Institute of Biology, Biochemical Society, The Royal College of Physicians, Royal Society of Chemistry, The British Pharmacology Society etc), in the development of courses.

Our impression is that there is a necessity to convince many universities of the need for clarity in the aims and objectives of particular courses and in their long term value. Students entering courses will increasingly seek this information, and we also anticipate a trend for industry and other employers to demand increased transparency in the outcome of the course. It will also become more important for industry to know what specific skills (practical or otherwise) the student has. In the longer term Higher Level (5) National Vocational Qualifications (NVQs) will play an important role and we look to the ST&M Council to play an increasingly important role here, in consultation and collaboration with other ITOs and NTOs such as the ABPI.

(c) Recommendation 30: Relations with HEIs

Companies should take a strategic view of their relationships with HEIs—aim is to see an increase from current 5 per cent of industrial research spend in HEIs towards 10 per cent.

Not only do we agree but we would emphasise that the success of the pharmaceutical industry in the UK has been through its commitment to research and its positive interactions with academia. We do not believe that there is a particular problem in the interface between the pharmaceutical industry and academia. Currently the industry already makes a significant investment in financial and in intellectual input to true collaborations with academia, in addition to contract research and clinical research carried out in the UK universities and medical schools.

However, we would emphasise that the main priority for the industry is strategically focussed collaborative research interactions, not the placing of contracts for routine work. The probability of a collaboration being established depends almost entirely upon the quality of the research being done in the academic group, in addition to the personal links established between the company and the individual academic. The quality of the research will be determined both by the intellectual and scientific calibre of the scientists, the availability of good facilities, and adequate resources. The industry and science in general are international and, though proximity between collaborators may facilitate a collaboration, distance is not seen as a barrier. The market for collaborations is becoming increasingly competitive and the pharmaceutical industry will become a more increasingly highly selective customer, demanding both quality and value for money from its collaborations. As an indication of this trend one of the leading UK R&D based companies now spends around 27 per cent of its academic research expenditure outside the UK compared to 5 per cent in 1988.
from overseas of high quality students by companies, based on their links with the HE sectors of all countries. Recruitment into UK from elsewhere in Europe and the United States is now common. The same is true for companies based in the US, with recruitment from the UK. Flexibility of mobility is the norm.

The Association appreciates that the National Committee of Inquiry looked across all industry sectors and the approaches taken by the pharmaceutical industry may be atypical. Potential barriers to effective collaboration between pharmaceutical companies and academia include the ownership, but more importantly the management of, intellectual property arising from such collaborations. The industry is dependent on a strong intellectual property base for the long-term (up to 10 years) and very expensive (£200 million) development costs for the development of a new medicine.

(d) Recommendation 31: Postgraduate Research Training

HEIs should review postgraduate research training . . . to include development of professional skills such as communication, self-management and planning.

We believe that the Dearing report is right to draw attention to the current problems with postgraduate research training and considers that this is an issue that requires immediate attention. Appropriate attention must be given to the development of professional, life-time skills, particularly for research based graduates. Also, in addition to these professional, transferable skills, the industry's continuing concerns over the lack of specific laboratory skills of many graduates leaving their first degrees has to be considered, and some action implemented as a matter of urgency. It is also apparent to many member companies of the Association that graduates are qualifying with the "knowledge" but not the full understanding of their course material. This may reflect on teaching standards, and/or an inappropriate combination of modules, with inadequate laboratory facilities in many universities playing a part. All of these factors will have a knock-on effect as graduates start their postgraduate research training. We do, however, feel that the problems of research students are only one aspect of a much larger problem, that of the overall career structure for scientists in academia and in industry, (Para 11.90). Though there have been a number of recent reports on this question from an academic viewpoint, we believe the issue now is implementation. The ABPI is very willing to become involved where it can in the process of trying to produce workable solutions. Of equal concern is whether students who read science get to university with adequate reading, writing and communication skills. Valuable, and limited time at the postgraduate level should not have to be spent on teaching basic skills that should have been developed during the earlier part of the education system.

With regard to research students and the quality of their training we see some of the problems being linked to general Quality Assurance issues, particularly the standard of supervision and training in generic skills. Some of these issues have been addressed by professional bodies such as the Institute of Biology and Royal Society of Chemistry, but there appears to have been little implementation as yet. It is of concern to the ABPI that some supervisors do appear to use PhD students as "cheap labour" rather than providing training opportunities. We would like to see a specific sub-division of the Quality Assurance Agency taking responsibility for research training issues at both pre- and post-doctoral level. If, as is implied in the Report (11.87), research studentships are likely to be restricted to academic departments with high RAE ratings, then there will be a concentration of research students and an opportunity to put proper professional training programmes in place. This would be welcomed. Indeed this could be made mandatory for a department that wished to have studentships from major funding agencies. We suggest that there would be no difficulty in introducing such a requirement for industrially-funded studentships, but we accept that this would bring difficulties if other students, within the same department, were not obliged to follow a similar training programme. Such training must, however, be maintained at post-doctoral level and not restricted to research students.

Notwithstanding the comments above, the ABPI does not underestimate the difficulty that these universities which seek to work with the pharmaceutical and biotechnology companies in developing appropriate professional skills will face in identifying the industries' rapidly changing needs.

The pharmaceutical industry is in a major state of flux, not only in terms of new technologies, but in the organisation of its working practices. There is an increasing need for flexibility and a "self-starter" approach in those whom companies take on. Communication, self-planning and self-management skills will be important for the industry as it enters the next century. Research departments will be more multidisciplinary and interdisciplinary, start-up and spin-out companies will proliferate and the previous long-term stability of individual jobs will not remain. Those who can develop the skills to be adaptable from a technical and personal development viewpoint will survive and thrive, and with them the innovativeness and competitiveness of the industry sector.

The challenge facing the HE sector is how they will seek to instil this need for flexibility of approach into their training of postgraduates, and to encourage them to recognise that there are stimulating careers outside academia.

(e) Recommendation 32: Interdisciplinary research

(i) *A study should be commissioned to look at funding of interdisciplinary research—and this study should inform the next RAE.*

We share the view that interdisciplinary research will continue to grow in importance and indeed the industry already funds such research. In the pharmaceutical industry there is increasing reliance on non-traditional disciplines outside the biological and chemical fields such as robotics, nano-technology (for screening), bioinformatics etc. In addition the industry depends heavily on the productive synergy between chemistry and biology and in this regard we welcome the setting up of the Health and Life Sciences/Chemical Panels (JAG Joint Action Group) to look at the chemistry/biology interface and to see how the linkages in this area are strengthened. The ABPI hopes, however, that following the further consultation exercises there will be an implementation and funding of new schemes to encourage disciplinary research, rather than further discussion of the problems.

An important area of interdisciplinary research, not always considered, is the interface between science and clinical medicine that is strong in the UK, but much weaker here than in the USA. In this context, we reiterate our strong support for Intercalated Degrees for medical students. The students who go through these courses are must more likely to become research clinicians—and this exemplifies the necessity to sow the seeds of interdisciplinary research at an undergraduate level. It is recognised that the Research Assessment Exercise currently inhibits interdisciplinary research and we do welcome any further action that would overcome these problems, and those caused by other interdepartmental boundary conflicts within and between universities.

(ii) *Research councils should fund a higher proportion of indirect costs—shift to a minimum of 60 per cent.*

The ABPI agrees with the Committee's findings that the failure of universities to recover the full costs of research from Research Councils and other funding bodies has, over time, led to a deterioration in the infrastructure of HEIs. All research projects in universities should be funded appropriately so that the full costs of the project are met. There is little point in underfunding projects as HEIs have to transfer funds from other parts of the system to cover the gaps. Research Council grants should cover the real indirect costs of the projects being funded, but more effort needs to be put into determining on what basis these overhead costs be determined. We do have some concerns over whether basing the indirect costs of the project on the salary costs is the best way, although it is the norm at present. It is not entirely clear as to how the Committee decided on a figure of 60 per cent as the proposed future contribution to indirect costs. We believe that the figure could vary, using the salary based approach. The ABPI would have little confidence that many universities would be able, at present, to provide accurate information as to the real costs of research studies.

If the Research Councils have to increase their indirect cost funding to over 60 per cent then, as the report indicates, this will mean that the Research Councils will have to find at least a further £100 million to meet these costs.

If additional new funding is not made available by the Government, then Research Councils will either have to reduce the number of projects they fund, or seek further money from the Higher Education Funding Councils (HEFCs). Whilst we agree that there should be some transfer from HEFCs to Research Councils, the latter approach would inevitably lead to further selectivity, with larger research departments being better funded. There is some concern that, if not managed, the selectivity could go too far. On the other hand, there are already significant limitations on the amount of world class research being funded by the Research Councils. Any further reducation in their budgets would have serious implications. The Committee of Inquiry has recognised that government spending on university infrastructure is too low. If no additional funding is made available, a compromise on increased selectivity versus reduced training and project support will have to be made.

The ABPI does not support the abolition of the dual funding system as we are not convinced that individual innovative researchers and new research groups will be supported effectively.

(iii) *Increased selectivity in the next RAE*

We endorse the principle of supporting excellence of a national and international standard in research and fully recognise the necessity for increased selectivity in the distribution of research funds. With the limited funding now available, it has become impossible to enable all academics to carry out, and be funded for, the research they would like to do. Our concern would be whether the RAE is a sufficiently precise tool particularly when considering emerging areas and novel collaborative interactions. The RAE should be re-examined before the next round of funding allocation to ensure that it can cope adequately with interdisciplinary research, collaborations between universities, and the increasing contribution from the appropriate industrial sectors. Whatever future RAE system is established, we would not wish it to be impossible for new research groups to emerge. The provision for departments to move into the higher ratings should therefore be welcomed.

(iv) *Industrial Partnership Development Fund set up—an umbrella covering LINK, CASE, TCS etc. Projected that funds managed by DTI under this scheme should double over 20 years.*

We will welcome this consolidation provided that additional funding is made available from the DTI, and that the net effect is to reduce bureaucratic hurdles. We would hope that the regional targeting that is mentioned does not weaken the national economic development aspects. Although many companies do work at a local level with universities in their vicinity, major research-based, scientific interactions are relatively insensitive to geography and tend to be national rather than regional. Whatever new development fund is set up, the ABPI would hope that adequate consultation with industry sectors will take place on schemes that will affect them.

(v) *Government should establish a revolving Loan Fund (£400–500m) to restore infrastructure "in a limited number of top quality research departments".*

We agree with the findings of the report that there is a serious deficiency in the infrastructure at present, but do not consider it likely that the pharmaceutical industry will want to contribute to a shared fund scheme in an attempt to solve the problem. The industry will not want to shift funds from its existing well-resourced directed programme of focussed and strategic research collaborations, in selected centres, into a general non-focussed system. We can see serious problems in companies justifying, to their upper management of companies, and their shareholders, the need to put money into a fund over which it had no direct control and which is not tied to specific and industrially-relevant projects. There would be no strategic advantage in it for companies, nor would they be convinced that the scheme would lead to an increase in the funding of quality research.

Many reports have shown firm evidence of the current infrastructure problem affecting universities. The provision of adequate infrastructure is, we believe, a government responsiblity. It is possible however, that the development of a loan scheme, sourced from Government funds, could have some short term benefits in helping to overcome the present, and real infrastructure crisis. It is doubtful however that even this sort of scheme would solve the longer-term problem of deciding how limited funds can be targeted most efficiently and effectively to the appropriate departments and institutions. Ways have to be identified to encourage universities to share equipment, of focussing a greater precentage of research into areas identified as key objectives for the UK, but at the same time finding additional remedial funds now to get the infrastructure of key laboratories back to appropriate levels.

(f) Recommendation 35

Establish new high level independent body to advise on direction of national policies for public funding of research etc.

We welcome any increase in the transparency of the current consultative processes determining the strategic management of UK science and technology. The pharmaceutical industry has worked closely with initiatives such as Technology Foresight, and is pleased to see this exercise continuing. The process of decision making in the implementation of the recommendations of the various panels is however not that clear.

We particularly welcome the comment that consultation with industry should precede the establishment of schemes that may demand matching funds (Para 11.71). It is certainly not clear, however, whether another high-level body consulting in private will help with the improvement of transparency, nor be necessary in the development of national priorities of research.

(g) Recommendation 39

Government should consider establishing a modest equity fund to support creation of Technology Incubator units—and HEIs should establish more Technology Incubators.

We strongly support this idea. We recognise that innovative researchers working in academia often have difficulty in developing their ideas to a stage which would enable their scientific and commercial feasibility to be demonstrated adequately. Technology incubators are one way of bridging this "development gap", adding more value to the project, and thus increased potential returns to the collaborating HEI. The ABPI firmly considers that in the future the pharmaceutical industry will increasingly seek alliances with spin-off companies, a number of which could arise from such technology incubators. It is also to be hoped that start-up companies would become capable of independence. Members of the ABPI have an involvement with the new Manchester BioScience Incubator and other companies are involved with similar schemes to facilitate the setting up of specialist companies seeking to comercialise academic discoveries, e.g. the Oxfordshire BioTechNet.

(h) Recommendation 40

HEIs should encourage entrepreneurship.

As indicated earlier we support the idea of HEIs trying to encourage entrepreneurship in students ie in recognising the need to adopt a flexible approach to their career development. We also also suggest that HEIs should seek to develop flexible arrangements to encourage staff to establish technology companies and spin-off companies and, if necessary, return to full-time academic life at a later stage. Recommendation 39, if acted upon, could facilitate this and local exemplars will be particularly persuasive.

(i) Recommendation 52

HEIs should develop and implement arrangements that make true costs of research transparent.

As discussed earlier in our response in connection with the Research Council funding of research, and the payment of indirect costs, the ABPI wholeheartedly agrees with any moves to encourage HEIs to make the true costs of research transparent. Such transparency and clarity is essential if HEIs are to develop effective costing mechanisms for collaborative and contract research base projects with industry and other funders eg medical charities. The ABPI has worked closely with the CVCP, AMRC (Association of Medical Research Charities), AURIL (Association for University Research and Industrial Liaison) and members of the

Foresight Health and Life Sciences Panel to try and identify the key issues in the costing of research and the payment of appropriate indirect costs. In these discussions the ABPI emphasised the significant difference between contract and collaborative research links with universities.

In costing out such different projects the ABPI considers that the HEI needs to identify exactly what it, and the industrial partner are putting into the relationship. Contract research carried out by the HEI for the company will attract full costs. In collaborative research, in which both partners contribute in terms of intellectual know-how, equipment, reagents, staff times etc, indirect costs will be less (40-45 per cent on average). To participate in such collaborative research the HEI will need to decide whether such work is of strategic relevance to the university. It must also have in place effective accounting procedures.

We welcome this recommendation, and look forward to working with the appropriate organisation as it is taken forward.

4. OTHER ISSUES

(a) Quality Assurance Issues

We particularly welcome the proposal to introduce stricter Quality Assurance/Quality Control measures and will encourage our member companies to become increasingly involved in the QAA. The QA issues are not simply those of ensuring that standards are met and maintained, but also issues of narrow module choice leading to inadequate breadth and concerns over students who possess knowledge but lack understanding.

(b) Qualification Framework

We welcome the development of a Framework for qualifications and particularly the necessity to identify clear stepping-off/rejoining points in the Framework. Our only concern is the extent to which individual HEIs will be willing to embrace the philosophy of the National Qualifications Framework. Acceptance of students from a variety of backgrounds is the key to the flexibility that is the objective of the framework.

(c) Regional Grouping of HEIs

We strongly support the encouragement of Regional groupings of HEIs, the establishment of collaborative projects both in teaching and research between departments in different local HEIs, and mobility of staff and students between Institutions. The regional provision of part-time HE courses can play an important part in professional career development programmes for our employees.

5. CONCLUSION

The Association welcomes the report of the study by the National Committee of Inquiry into Higher Education. As stated earlier in this response we recognise that the report's findings and recommendations will set the scene for the development of any new policies now needed to repair, maintain and strengthen the UK's science and education bases. The report has clearly identified major funding problems concerning the infrastructure of HE, it has emphasised the need for increased selectivity in allocating limited resources whilst seeking to maintain the country's excellence in areas of importance to key industry sectors. It has recognised that students of tomorrow need to be flexible in their approach to education, have the entrepreneurial skills needed to cope with a changing work environment, but at the same time needing to maintain high quality standards.

The Committee led by Sir Ron Dearing has carried out an excellent job in identifying some of the ways forward to try to solve the current problems, but there will be others that may need to be considered.

The ABPI now looks at the Government to establish an effective way forward, for the implementation of its key recommendations, and we look forward to participating in this.

Examination of Witnesses

Dr Gill Samuels, Director of Science Policy, Pfizer Central Research, Dr Robin Fears, Director, Science Policy, SmithKline Beecham, Professor Bill Dawson, Research and Development Adviser, Eli-Lily Limited and Dr Jeff Kipling, Director, Science and Technology, The Association of The British Pharmaceutical Industry, were examined.

Chairman

126. Good afternoon, Dr Kipling. Thank you for coming along with your colleagues this afternoon. I would be grateful if you would tell us briefly about the British Pharmaceutical Industry—I think most of us probably already know about it—and then if you would introduce your colleagues so we can start questioning as soon as maybe.

(*Dr Kipling*) Good afternoon, Chairman, thank you for your opening remarks. The ABPI—the Association of the British Pharmaceutical Industry - represents the majority of the companies in the UK who carry out research, development, marketing, manufacturing and supply of prescription medicines. Our members represent almost 95 per cent of the medicines supplied to the NHS. We thank the Committee today for the opportunity for us to take part in this review and we are pleased you are going to focus on university research, as it is an important topic which we feel may have been overshadowed by other aspects of the Dearing Review. First of all, I will introduce myself: I am Dr Jeff Kipling, Director of Science and Technology at the ABPI. To my right is Dr Gill Samuels, from Pfizer Central Research. Also to my right is Dr Robin Fears from SmithKline Beecham. To my left is Professor Bill Dawson, a senior Research and Development Adviser for Eli-Lily Limited.

127. Thank you very much indeed. We will direct the questions to you, Dr Kipling, but if you think they are best directed to one of your colleagues then we will leave you to make that decision and ask them to respond. If I may start, you were in the public gallery, I think, when previous witnesses were present and you heard that we were talking about the Industrial Partnership Development Fund or the possibility of it as an umbrella for all national initiatives designed to encourage applied research. How best could the funds proposed for this partnership be allocated to encourage industrial and academic collaboration?

(*Dr Kipling*) I will ask my colleague, Dr Fears, to comment on that, but an initial comment is that our industry is relatively insensitive to geography so anything that is involved with regional development, is probably not I think that relevant to the pharmaceutical industry, on the R&D side.

(*Dr Fears*) I would indeed endorse that. I think my first point in addition is that although from our reading of the Dearing Report we would not be entirely clear about the remit or indeed the working mechanism of the new fund, we see that it would be an umbrella mechanism covering all the present array of industry-academia partnerships in which the pharmaceutical companies participate quite extensively in the UK. I think we would welcome any opportunity to simplify the present convoluted range of mechanisms and of bureaucracy. Our concern is partly a geographical one, as global companies we invest globally in excellence wherever it is found. In the UK although many of our individual companies will invest in all regions of the UK, our investment is dictated solely by the criterion of excellence rather than regional aspects. That indeed is one point. The second one is that we might worry if an overarching umbrella mechanism became monolithic. I think there are too many competing mechanisms at the moment but certainly there is a need to continue experimenting with new forms of partnership. We would not want to see that loss of flexibility in the future. Thirdly, perhaps in the context of the previous point, we do not wish to see schemes imposed on companies without consultation.

128. Without consultation?

(*Dr Fears*) Without consultation. Whatever the mechanism, whatever the forms of partnership, we feel we do have something to say and if being asked to provide new money, would like to have the opportunity to influence the debate.

129. Dr Kipling—I do not know if I should address you or back to Dr Fears—if this new industrial partnership scheme came into being, do you think that should be in addition to the things which exist already like the LINK scheme or the Teaching Company Scheme or do you think all three should be combined into one?

(*Dr Kipling*) We are quite happy with the existing schemes. Dr Fears has commented on the bureaucracy. We can see this scheme as an umbrella pulling together the various schemes existing so there is no duplication of effort, and thus less bureaucracy. One thing that has to be remembered, the pharmaceutical industry has specific needs which are different from other industry sectors, particularly in R&D expenditure on our links with academia. We would be concerned if all the schemes were linked together.

130. Does your organisation apply mostly to very large companies? Have you small- and medium-sized companies?

(*Dr Kipling*) Yes, within the ABPI we have a full range of companies, from some very large companies to some very small.

131. May I ask whether you think a fund of the type we are talking about would help small- and medium-sized companies more than large companies or would it not make any difference?

(*Dr Kipling*) I think it could help the smaller ones more.

132. Apart from being the underdog, it is always the way that every big company starts as a small company so that is probably not a bad thing.

(*Dr Kipling*) Yes, particularly as the bio-medical-based industries develop more.

(*Professor Dawson*) If I could comment, I think one of the themes we will introduce is partnership; the larger companies work very well with the small companies and we would like to see them do well. We believe an Industrial Partnership Development Fund

[**Chairman** *Cont*]

should encourage the interface between academia and small companies because that is for the benefit of the industry as a whole.

Dr Williams

133. Given that I have a very high regard for pharmaceutical industries—very successful at exporting and everything else and very high R&D content—within your research and development budget there is only one or two per cent of that that goes to higher education or is spent within the universities. There are several schemes operating now. You are right to be cautious about this and that but generally, given that 95 per cent of your trade is with the NHS, you have a very large captive single customer, effectively Government money coming from them, why is the return, certainly in terms of higher education research, so very low at present?

(*Dr Kipling*) If I can start and then maybe Dr Samuels can comment on that. The pharmaceutical industry spends over two billion pounds a year on research and development and the size of the NHS market compared to the expenditure we spend on R&D is not connected. You talk about the small percentage we spend on academia, the industry actually spends quite a large amount on academia; it is not just in financial contributions, it is in terms of know-how, supply of reagents, supply of equipment, and other aspects arising from collaboration. There is a considerable amount of collaborative research between the pharmaceutical industry and academia in the UK.[1]

(*Dr Samuels*) Just to reinforce what Jeff has said, we put a large amount of funding into academia in terms of untied funds. If I was to speak specifically for Pfizer, last year we put in the order of £3.5 million in untied funds and that is away from tied funds on specific collaborations or contract work. There are large sums that go into academia. It is not just money, we provide true partnership, true intellectual partnership, on a large number of programmes which is mutually beneficial to the development of scientific projects on both sides. I think that is key to remember.

134. You do accept my underlying feeling that in Britain part of our industrial malaise is that universities tend to be academic and industry is somewhat out there, whereas in Germany, Japan, the United States there is a much closer relationship. I know that is not particularly true of pharmaceuticals but do you recognise that in general there should be much stronger ties between industry and research and higher education?

(*Professor Dawson*) I think two answers really. We believe we do have a strong partnership. There are many of us who have visiting professorships; there are many of us who teach within the academic sphere. We believe that we should continue to do that because it is beneficial for the students, for the training element of the students, to see who does the work within departments. I think the percentage of funding is a discussable topic. Most of us would like to put a significant proportion in and do the best we can but we are attempting to maintain a core group of scientists within our own organisations who can deal at the cutting edge with academics. It is very important that you have a strong enough internal group to benefit from what academia is doing. If you allow yourself to be directed into too wide a range and cost of extramural activity, you lose the internal credibility to maintain the extramural links.

Dr Jones

135. Could I ask you about trends in the funding for research, both the untied and the research agreements which I presume you would regard as tied research. You have said there is an increasing international competition for research contracts; is that the only reason why perhaps there is a trend, as we were told last week by Save British Science, for industry to invest overseas or are there any other reasons? What is happening to untied investment in our higher education systems?

(*Dr Fears*) We would distinguish tied versus untied as contract versus collaborative in certain aspects. Many of the UK pharmaceutical companies are indeed beginning to place an increasing amount of their academic liaison research abroad. My own company has been experimenting, for example, through the European Commission funded Framework Programme to try and build research networks throughout Europe, not so much to attract Framework Programme funding, although that is an incentive, but to build new cultural networks of a British company. That trend, I think, for large UK pharmaceutical companies has become manifest only in the last couple of years as an experiment for us. As we said in our opening remarks we will always invest primarily for research excellence, that is the overwhelming criteria, and we will invest wherever we find that throughout the world. I think it would be true to say that we are beginning also to see new resources of research excellence in some of the emerging countries. My own company is beginning to experiment in investing in China and there are incentives to do that but again the criterion is research excellence. There are new competitors for the UK in this. This will apply both to our tied and our untied, contract and collaborative research. The difference to us, apart perhaps from the fiscal one of overheads, is with regard to the contributions we make to the liaison over and above the financial. I think it is an important point to emphasise that in all our research collaborations we provide more than just money, we provide intellectual resources. We may also provide other important elements such as new reagents, new chemical compounds, proprietary models and so on; so it is a true partnership in intellectual terms as well as in financial terms.

136. Do you feel that a crisis in university infrastructure funding is having an adverse effect on your members' investment in British universities?

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[1] *Note by witness:* Member companies of the ABPI supply more than 90% of the prescription medicines taken up by the NHS. Britain's domestic market accounts for less than three per cent of the total world market for pharmaceuticals, but almost ten per cent of the world's pharmaceutical R&D expenditure is in the UK. For some R&D intensive UK based companies, the home market actually accounts for less than ten per cent of their output.

[**Dr Jones** *Cont*]

(*Dr Fears*) We fear that. The UK has had a fine tradition of excellence, particularly in the life sciences, but it is a fragile asset and it does require nurturing and because of the relative under-investment in infrastructure we have already heard about from the CVCP we do worry about declining quality, about the increasing patchiness of the quality. There are still many centres of excellence in the UK but frankly they are declining in number. We do worry about that both in terms of our ability to conduct research collaborations in the UK and our ability to recruit in the UK as a highly R&D intensive industry. We are big recruiters of scientists. We worry about the ability to sustain our own internal partners.

Dr Gibson

137. Was there one moment when that happened or has it been a gradual attrition?

(*Dr Fears*) It has been a gradual attrition. Certainly it was not helped by the point that the CVCP made earlier, when there was a large reduction in capital budget, which was tantamount to a reduction in research equipment. There have been fairly immediate causes in recent history but it has been a process of attrition over a period of time.

(*Dr Kipling*) Dr Fears talked about maintaining the science base. As the pharmaceutical and biotechnology industries move into a post-genomic age, biomedical research is changing; it is expensive. We need to be strengthening the science base and there are particular areas in which our industry interacts with HEIs which are areas of expensive, big science.

Dr Jones

138. Are we training enough scientists and engineers?

(*Dr Kipling*) I always have difficulty commenting on numbers, we should be talking about whether we are training enough high quality scientists and engineers in HEIs. I do not think we are.

(*Dr Samuels*) That is one of the reasons why we have to go and recruit scientists from outwith the UK because of concerns over the quality of graduates.

Chairman

139. Well, it would be fair to say that some of our quality graduates are going out of the UK anyway, are they not, so there may be an exchange?

(*Dr Samuels*) Some of them are, yes.

Mr Beard

140. Is there any difficulty in retaining or recruiting post-graduates for research appointments given the short-term nature of the funding from the research councils?

(*Dr Kipling*) I would like to start. You are talking about recruitment within the industry? The industry employs full-time people. We collaborate with the universities and HEIs who may use some people in short-term contracts but I think the issue of short-term funding is really a question you should be asking the research councils.

141. I was really asking it to see whether you perceive there is a weakness there on the university side, the temporary nature of the employment of some of the people you are collaborating with?

(*Dr Kipling*) There is a problem of career progression within academia because of the use of short-term contracts. Maybe Professor Dawson would like to comment.

(*Professor Dawson*) Just a quick comment. I think all of us would like to see post-docs do a number of post-docs because they become much more rounded people when they come in for permanent employment. The industry does take in post-docs as an academic institution would to give them that experience. We do not really mind whether they go on to another company or on to academia. It is creating enough quality people to go through that transition. We are worried that there are not sufficient good people and not enough opportunities to provide them with a career development pattern.

Dr Jones

142. What are the factors, would you say, that are preventing this production of people with the necessary quality?

(*Professor Dawson*) If I may, Chairman. I think scientists or young people who are going to become, or develop as, scientists look at the career pathways and think "that is hard work and the opportunities are not great, so perhaps we will do something else". That is one of the key messages.

Chairman: We must move on. Mr Jones.

Mr Jones

143. I think we have identified a problem with short-term contracts and short-term funding. Is it the same overseas? Is the difference in funding overseas, if there is a difference, attracting our scientists? Is that part of the problem? Are we suffering a partial brain drain?

(*Professor Dawson*) At graduate level there are not many graduates who go unless they can be trained in a PhD in a remote country, whichever that country is. I think it is beneficial to post-docs to do time in Europe or in the US or in Japan. The encouragement should be able to bring them back in. Any programmes that can be developed by the research councils or HEFCE to bring good students, good post-docs, back would be of major benefit.

Dr Turner

144. I would like to change the line of questioning slightly. Your own submission suggests a lot of reservations on the Research Assessment Exercise system and in particular, firstly, you seem to think that it discourages interdisciplinary research. Can you elaborate on the way in which you think that the RAE does in fact penalise interdisciplinary research?

[Dr Turner *Cont*]

(*Professor Dawson*) Chairman, that is for me to talk about. We believe the RAE exercise, by assigning points to individual departments within individual universities, does not encourage interdisciplinary research within any university or in inter-university collaboration. In our world of the pharmaceutical industry we have excellent collaboration between many different disciplines to solve difficult problems. We would like to see the Research Assessment Exercise have that as part of its criteria and we have had discussions with Professor Fender to try to have that in the next round of RAE. We belong to an industry that is audited and we think audit is appropriate so we believe in an RAE of some form. It should be flexible. We believe it has improved with the three iterations and we would like to see it continuing to improve.

145. Dearing also suggests that the way in which the research councils fund research also penalises interdisciplinary research. Would you agree with that?

(*Dr Kipling*) Not necessarily. I think we have seen some improvements. There are a number of initiatives. We have close collaboration between the EPSRC and BBSRC on bio-molecular sciences. We are aware that the MRC and BBSRC discuss a number of issues and we know they are about to launch much-needed courses in bio-informatics. We used to have major concerns some years ago but I think now it is safe to say that the research councils are tending to work more closely together to support the wide-ranging nature of research.

146. Another criticism that has been made of the Research Assessment Exercise is that it is not very good at assessing applied research. Do you think that this adversely affects your efforts at promoting collaborative research with academic departments?

(*Dr Kipling*) The Research Assessment Exercise certainly inhibits industry collaborations with some university departments; they do not benefit from contact with industry; they certainly do not get any points for it in the RAE. Industry has been proposing to HEFCE that that should be taken into account. A lot of industry-academic research is high-quality, basic, collaborative research and universities that are collaborating with industry should be rewarded for it, not penalised under the RAE.

147. Okay. The $64,000 question is what would you suggest to amend the Research Assessment Exercise because as you yourself, Professor Dawson, say, you think there should be some form of audit. Can you suggest some sort of framework for it?

(*Professor Dawson*) I think what we have seen is that there has been an increasing number of industrialists participating in the panels and I think that has been hugely beneficial. I think that the number should not be increased more dramatically but it should be maintained. I think the criteria should allow reward for applied science to be recognised easily within RAE which it currently is not. I believe that can probably be achieved by guidance to the chairs of the various subject panels to make sure in their deliberations they do pick that up because the information is usually there in the write-up.

148. How would you address the problem of interdisciplinary research?

(*Professor Dawson*) Personally, I would give bonus points for interdisciplinary science both between universities, between departments and with companies.

Mr Turner: That sounds like a nice answer.

Chairman

149. Can I move on to indirect costs. In your submission to us, for which we thank you, you question the use of salary costs as a basis for the calculation of overheads in research projects. Following Mr Turner's $64,000 question, you question them but what would you have in their stead?

(*Dr Kipling*) I think the total cost should be worked out; the cost of reagents, equipment etc, and not just based on the salary.

(*Dr Samuels*) Can I just say that I think it is obvious in negotiations that many universities are not aware of the full costs involved in the programmes, their own full costs. If those were more transparent to universities and more transparent to us then it would be easier to reach a win-win situation in this.

150. Presumably you both give that answer because there are certain research projects where salary is a very high proportion of the cost and there are others where it is a very low proportion of the cost and it is, therefore, a distortion.

(*Dr Kipling*) Yes. It is a distortion. The use of technicians and reagents needs to be costed, and it should be open and transparent.

Chairman: Thank you very much.

Dr Gibson

151. The reason for that is because they were frightened to ask for money, for the real cost, because they thought they would not get it. There is a going rate for a research grant that you know you can achieve. There is a mythology about all this. Do you agree with that statement? You do not ask for £120,000 because you will not get it; that is what the universities are told. That was through the Research Council grapevine but we all know that.

(*Dr Samuels*) I think our direction of collaboration is governed purely by the excellence of the science and the cost is a secondary factor. We will go where the science is whether it is in the UK or whether it is abroad.

Chairman

152. Then, Dr Kipling, in your submission again you favour some dual support transfer to help the research councils meet the additional burden of funding fully the research projects that they want to support. Where do you think that additional money should come from?

(*Dr Kipling*) In our submission we commented that if the dual support system disappears there will be some major problems. We recognise that if research councils overnight, without any additional money,

[Chairman *Cont*]

have to start paying increased costs they will reduce the number of projects they will fund. I think neither of those options is favourable. One would hope that there will be additional funding going in to cover the infrastructure problems. For some of the reasons we have just discussed, the way the universities cost out their projects, there is confusion and there are a lot of major problems in the funding of infrastructure. We would seek additional money going in to HEIs for that.

153. My final question, before I go to Mr Beard, is that you refer again in your submission to greater selectivity to compensate for full funding of projects. What risks do you think there will be if we went for greater selectivity and therefore some projects dropped off the bottom? Is there a danger that some of those might be major projects that might have developed and blossomed or are you happy that greater selectivity should be followed?

(*Dr Kipling*) If I can just make one comment and then Professor Dawson will come in. We are looking for excellence. If there is a limited amount of money, if no more money is going to be available from the Government, we have to make some difficult decisions and therefore we should have a process of funding quality, world-class research. Whatever process is decided we would encourage it but we have to make decisions on selectivity.

(*Professor Dawson*) I think selectivity must be the answer to this particular question. If you look at all of our companies, both small and large, we have all gone through an exercise in selectivity to ensure that we can adequately fund the projects which we think are important. That has necessarily meant that some of the excellent projects did not get funded. We recognise that there is pain in this issue and we have gone through it by and large and we will continue to go through it because the cake does not substantially increase. We believe that the academic sector will need to find a process to go through that exercise and, as an industry, we would like to offer what help we can because it is difficult and it does hurt. If you do it university by university I think that is unacceptable. If you do it on a departmental basis I think it is easier to manage because then you can ensure that the infrastructure of academia is not harmed too much.

Chairman: Thank you very much. I think that is a subject we could go on a lot further about but we have not got the time. If you feel that we have not questioned you enough on this particular subject of selectivity, and if you have prepared answers to questions we have not asked you, would you be kind enough to put those answers in the post because we would still like to consider them. Clearly in a session like this we cannot go deeply into every issue and there may well be some points you may wish to make that we have not drawn out from you.

Mr Beard

154. The Dearing proposal for tackling research and infrastructure and equipment deficiency is the revolving loans fund which you describe in your submission as unworkable and insufficient. Have you got any proposals to make good those deficiencies?

(*Dr Samuels*) We are pleased that Dearing recognises the challenge that the universities have in terms of funding for infrastructure although, as we heard in the CVCP debate, they are of different orders of magnitude and remain to be resolved. However, the rolling loan fund as proposed is not one that we feel we can support. The funds that we put into it are highly directional and our concern would be that this fund would not take account of where we would want to put our strategic funding and that would be impossible to justify.

155. I understand that but have you got any positive proposals or alternatives to that revolving loans scheme for making good this recognised deficiency, whatever its actual scale is, because there is one there? In making that good are there any alternative proposals?

(*Dr Fears*) I think the overwhelming point for us is we see it as a Government responsibility. Dearing's proposal on the revolving loans scheme has some attractive elements. Yes, there is a need for greater accountability and audit, there is rightly an identification of a deficit, but we do not see it as our responsibility to fund the research infrastructure in this way although each individual company will often fund infrastructure in our own research collaborations where we think we can get something out of it to our own company's benefit. We do not see the value to ourselves in contributing to some general scheme of this sort, and indeed we would see problems in so far as there is a finite pot of money and that would perhaps detract from money that we would be spending on our specific collaborations with universities. Frankly, we see the responsibility as that of the Government.

156. Is that a view that is widely shared in the pharmaceutical industry?

(*Dr Fears*) Yes.

(*Dr Samuels*) Yes.

(*Dr Kipling*) Yes.

157. The Joint Research Equipment Initiative that was brought in in 1996 under Foresight, would you say that is a positive addition to the research capability?

(*Dr Kipling*) First of all, Chairman, the amount of money involved was fairly small. Secondly, this was another one of the schemes that was forced upon industry. The scheme required a 50 per cent contribution from industry. The first time companies heard about it was when an academic was knocking on their door asking them to provide the other 50 per cent, which does not encourage collaboration. I think some of our companies have made use of the scheme but I do not think it was a major initiative. I do not think our companies particularly would support it if it was expanded.

(*Professor Dawson*) I think, to pick up on Dr Samuels' point, where it has been possible to have directed research within the framework of the Equipment Initiative that is excellent because then that is win-win and everybody is very comfortable with that. We will continue to work in that mode.

158. But not in general?

(*Professor Dawson*) No, I think not. I think the answers lie in selectivity rather than in let us see if we can find a big chunk of money from somewhere.

Dr Jones

159. You have been advocating extra Government funding for infrastructure in universities, I understand. How quickly should this come? Are you satisfied with the response so far?

(*Dr Kipling*) Very quickly. No, we are not satisfied. I think there is a crisis in a number of university departments and I think we have to take some fairly urgent action now to identify those that need supporting. I think we need more money going into infrastructure as a matter of urgency.

(*Dr Samuels*) The success of the pharmaceutical industry here in the UK is well-known. It is based on the high quality science base that we have here in the UK. That, to a large extent, is the product of investment from the past. I think our concern is that the crisis now will severely interfere with the science base in the future and, therefore, will severely interfere with inward investment here in the UK.

Chairman: Thank you very much, Dr Kipling. I would like to congratulate you and your colleagues for having given such succinct answers so that we have been able to get through a very difficult session in a limited period of time. I do reiterate what I said earlier: we would welcome any additional information that you feel we have not teased out of you because we value the advice and assistance that your organisation has given and will give in the future. Thank you for being with us this afternoon.

Memorandum submitted by The Royal Academy of Engineering

1. NATIONAL RESEARCH POLICY AND ADVISORY COUNCIL

1.1 The Academy supports the recommendation for a National Research Policy and Advisory Council but believes that the detailed implementation will require very careful analysis. This should be based on a full appraisal of existing mechanisms such as the Council for Science and Technology and the SEBCC; such an appraisal does not appear to have been done as yet. It is important that an advisory council should replace existing bodies and not simply provide another layer. The Council should be fully independent and to ensure transparency, it should be required to publish an annual report which would include details of all advice given to Government.

1.2 One of the key features of the Foresight exercise has been to drive priorities in national research funding and in this it has had limited success. The constraints have been that there is no single autonomous body to receive its output. The formation of an Advisory Council would fit well with Foresight and help focus the national R&D spending more effectively. It could also promote interdisciplinary research areas that currently fall between the individual concerns of the Research Councils. There is also some concern that not enough emphasis has been placed on technology transfer and the findings of funded research; this should be addressed.

1.3 It is essential for an advisory council to recognise the importance of the UK remaining competitive in the international market. It should therefore take on the role of regularly monitoring international research policy activities.

2. THE RESEARCH ASSESSMENT EXERCISE (RAE) AND THE BALANCE BETWEEN TEACHING AND RESEARCH

2.1 The Academy agrees with the Dearing Report that greater support is needed for interdisciplinary research. The recognised contribution of interdisciplinary research and the tendency of the RAE to operate along firmly single discipline lines would suggest that the proposal to commission a study in this area had merit. Most areas of science and technology currently exhibiting rapid growth in the UK are interdisciplinary and a defined method for collaboration between the panels is needed.

2.2 One suggestion is that it should be possible for submissions to include an optional section on interdisciplinary research which is then passed for comment to the other panel(s) involved; a relevant member of each panel should then judge its quality, to avoid such research being scored too severely as being peripheral to the work of any one panel.

2.3 The next RAE must give serious credit to units of assessment committed not just to research quality but also to postgraduate training quality. This is vital if investing industries are expecting that good training is closely linked to quality research.

2.4 Research should be closely linked with teaching and it is important that teaching is not devalued through the RAE. The report does not place enough emphasis on this issue. For those departments which are active in both research and teaching, the problem remains of cross-subsidy between the two. There are probably as many examples of teaching funding research as research funding teaching. The only adequate solution is to ensure that they are both properly funded.

2.5 The efficiency could be greatly enhanced by allowing some departments to opt out of the RAE and instead apply for special funding which could be awarded on the basis of personal research development. There may also be a case for a research mentor system with stronger research based universities for specific members of staff in their institutions.

2.6 The Academy supports the recommendation that universities be encouraged to make strategic decisions as to whether they apply for competitive (through RAE) or non-competitive research support from funding bodies. There is concern among Fellows of The Academy that the amount of non-competitive money per member of staff suggested for those opting out of the RAE is insufficient to provide any meaningful support to engineering departments, in particular to small departments. It is important to fix a realistic amount for non-competitive reseach funding and crucial that this relates to real costs of research in different subject areas.

2.7 The absence of visits to the institutions by RAE panel members, as occurs in the Teaching Quality Assessment is a weakness of the RAE. If the numbers of competing universities were reduced such visits may be possible.

2.8 The Academy has also submitted a report on the 1996 Research Assessment Exercise to HEFCE, a copy of which is annexed to this evidence.

3. Availability of Publicly Funded IT infrastructure

3.1 The cost of IT support in engineering has now achieved a dominant position in research funding and needs to be properly resourced from research grants and contracts as well as via the Funding Council central support. This is a continuous and ongoing area for resources which must be looked at with priority in any future funding plans.

3.2 It is essential that access should be influenced and/or controlled by charging. "Free provision" has led to seriously inadequate provision when needed and no means of differentiating priorities by the providers or users.

3.3 The increasing move towards global collaboration has led to a need for world class standards in IT if UK universities are to compete internationally.

4. Research Equipment Loan Scheme

4.1 The Academy supports the proposal for a research equipment loan scheme. The general state of research equipment in the UK is regarded by many as poor and is inhibiting the next generation of research. However, there is concern that the loans would still have to be paid off and the major problem, except for very large capital facilities, is how to raise the funding, now or in the future.

4.2 To be realistic, to allow universities scope for servicing any loans, this would need to be a non-profit making loan scheme with interest rates kept low enough for universities to maintain interest and capital repayments.

4.3 There is a real danger that industrial partners will look away from UK universities if access to state of the art equipment is no longer available.

5. Funding for Research Infrastructure

5.1 It is extremely important that the university infrastructure is adequately funded; past under-investment in the research infrastructure must be put right. The uncertainties of short-term funding lead to inefficiency and instability in UK University research. There has to be a continuing long-term research base in a range of universities and some form of dual support is the only way of achieving this in a realistic manner.

5.2 There is particular concern that a lack of infrastructure funding is resulting in insufficient funding for pre-proposal stage research. Research is initiated by an original idea in the mind of the researcher and is followed up, often as the subject of collaboration with a research student. In the UK, pre-proposal work has to be carried out mainly on the back of other, funded work. This is widely acknowledged but nonetheless regrettable. Fellows of The Academy are concerned that over the years the opportunity to pursue this vital initial stage has diminished; this may have serious consequences to the future of UK university research if not duly recognised and addressed. Experience has shown that in any proposal, the pre-proposal demonstration of proof-of-concept work is essential if there is to be any chance of obtaining support from industry or the Research Councils.

5.3 Universities must become transparent in their research expenditure so that the exact support needed for research infrastructure can be determined. A major injection of funds is needed to bring infrastructure up to date.

6. The Dual Support Funding System

6.1 The Academy supports the dual support funding mechanism but recognises that there may be a need for some modifications in the future.

6.2 It is generally accepted that the UK university base is losing international competitiveness through steady under-investment in equipment, buildings, facilities and people. Whether this implies that less should be done but properly funded or that more funding should be found is clearly a subject for debate and one on which Fellows of The Academy are divided. It is clear, however, that one or other approach must be adopted in the near future.

6.3 The Academy supports the view that the Research Councils should increase their payment for indirect costs to at least 60 per cent of staff costs. Many Fellows also support the view that this increase should be new money, not from a transfer from the funding councils. If it has to be found by the Research Councils it will result in a substantial reduction in the amount of research undertaken.

6.4 Regarding research undertaken for charities, many charities currently pay no contribution to overheads and this raises serious issues for future support of such work. There is a pressing need for negotiations on this.

6.5 Emphasis should be placed on better management of the funded research programmes and projects, with more effort being made to establish outputs and truly achieve effective output and dissemination on completion.

7. Funding for Interdisciplinary and Collaborative Research Projects and The Sharing of Facilities

7.1 There are real opportunities for sharing resources and developing strengths which cannot be supported by one institution alone. For example, Leeds, Sheffield and York Universities have formed the White Rose Research Triangle which has already been successful in securing one of the first four Faraday Partnerships, DTI biotechnology support, DfEE training support and has established a first tranche of joint research studentships. These universities are currently pursuing the possibility of collaborative equipment procurement and sharing, and an investment fund for exploitation of research. More detailed evidence can be provided to the Committee on this subject if required.

7.2 The national agenda for collaboration on research equipment outlined in the Report and by Government has many merits, but if this creates false marriages between adjacent universities, efforts will be counter-productive. Care must be taken that universities only collaborate where they have complementary expertise and can gain from the relationship. Artificially constructed partnerships could result in mediocre rather than world class R&D.

7.3 The Research Councils should recognise that more time and effort is needed to establish collaborative projects. Success depends on a good framework where the relative responsibilities of all parties are clearly understood.

8. Industrial Partnership Development Fund

8.1 The Academy welcomes the proposal to streamline and co-ordinate the various existing schemes through the establishment of an Industrial Partnership Development Fund (IPDF).

8.2 There are currently too many uncoordinated industry/academia programmes and a singly administered fund would be of great value.

8.3 Industry must be encouraged to participate and financial incentives must be introduced to make this attractive as well as meaningful.

8.4 There is, however, concern among Fellows of The Academy that constantly introducing competition and insisting on matching support from industry is a divisive mechanism. There is a role for this form of support but when it becomes the main source it can result in more support for those who already have enough and little for the rest.

8.5 It is important that researchers should have complete freedom of action in research funded in this way due to the different commercial interests of companies involved.

8.6 It has been suggested that the regulations for the DTI's SMART awards are amended so that companies in which universities own more than 25 per cent of the shares are eligible.

Annex

THE 1996 RESEARCH ASSESSMENT EXERCISE—FINDINGS FROM A SURVEY OF FELLOWS' OPINIONS

1. Introduction and Summary

1.1 The 1996 Research Assessment Exercise (RAE) has been the subject of a survey of Fellows of The Royal Academy of Engineering. The survey was conducted in mid-1997, some six months after publication of the RAE findings, allowing time for considered reflection on the exercise as a whole. The aim of the survey, simplistically, was to determine whether there is a need to amend the methodology employed when the next RAE is carried out. In total, 88 Fellows responded to the request for comments: 59 per cent were academics and the remaining 41 per cent were broadly industrial. This difference of background did not appear to influence the balance of comments received; however, inevitably those from the academic sector have had a much closer involvement with the RAE and can therefore, in general, make more detailed comments. Overall, most respondents were in favour of the RAE in principle, although many criticisms of the methodology were made. Nevertheless, without a form of review such as the RAE, most believe that university departments would have no incentive to improve.

2. General Comments

2.1 There is general agreement that the time and money involved in putting together a submission for the Research Assessment Exercise places too great a burden on departments and must be reduced. However, despite the bureaucracy involved the exercise has forced departments to place their research under scrutiny. Such self-assessment has resulted in an increase in the quality of UK university research, demonstrated by the overall increase in ratings obtained in the 1996 exercise compared with 1992.

2.2 An estimate of the total cost of the exercise, and the time and costs involved in putting together a submission should be produced.

2.3 Although there is support among Fellows for promoting excellence in UK research by concentrating research funding in a few universities, this will inevitably mean that research facilities will close at universities which receive reduced or no funding. Such closures are already occurring and the consequences of this for the long term health of the UK science and engineering base must be considered. It has been suggested that SMEs in particular need ready, local access to research expertise rather than a distant centre of excellence that is not interested in their problems. For such companies it is important to safeguard some degree of research expertise throughout the UK higher education sector.

2.4 A Government statement of long term aims outlining the type of university community anticipated in the future would be beneficial.

3. Criteria for Assessment

3.1 The criteria for assessment applicable to the next RAE should be made available to departments as soon after the previous exercise as possible. Similar criteria must be applied across all engineering disciplines, with greater transparency in the assessment process, comparable to that experienced in the teaching assessment exercise. More information and assistance should be given to departments when producing their submissions. In addition, the 5/5* boundary should be more clearly defined. The 1996 exercise has been criticised for the decision to allocate additional funds to 5* rated departments after the assessment had been carried out.

3.2 The emphasis on assessment of published papers rather than contract research and industrial collaboration could move the balance of research too far from industrial relevance. The current assessment criteria can result in departments being penalised for active involvement in collaborative research programmes with industry. Greater recognition should be given to departments for successfully securing research funding from industry and this should carry more weight in the assessment process.

3.3 The practice of only considering four published papers from each researcher has been questioned by many. Whilst the view that quality should always take priority is fully endorsed, it has been suggested that if only four papers are put forward for quality assessment, a measure of output in the form of the total number of referred papers published by a particular researcher should also be reported as a measure of quantity. The different weightings placed on each research journal by the different panels has been highlighted. It is important that all the panels assess published papers in the same way, so some degree of uniformity must be introduced. High quality industry related journals should also be given equivalent weighting to academic journals.

3.4 Greater weighting should be given to the number of research students and post-doctoral researchers in a department. Consideration should also be given to placing greater emphasis on the potential of young researchers rather than purely assessing contributions and papers published to date. This could be done by making some allowances to reflect young departments or individual researchers who are not yet in full flow of output. This would encourage institutions to value young research staff and include them in the assessment exercise.

4. Panel Membership and Behaviour

4.1 The assessment procedure carried out by the panels has been criticised for not being a developmental process. It is important that adequate feedback is given to departments after each exercise, so that they are able to make changes and improvements. Feedback after the 1996 RAE was very variable.

4.2 A lack of communication between panels appears to have resulted in whole fields being higher or lower rated. This could have major financial consequences for the departments concerned and reduces confidence in the fairness of the exercise overall. The chemical engineering panel in particular has caused great dissatisfaction through the low ratings it awarded, which on average were one point lower than other engineering panels. This resulted in some departments choosing to be assessed by other panels in the hope of attaining higher ratings. This would be less likely to happen if a measure of consistency was achieved across the panels. Some cross membership of panels should be included to give better uniformity of assessment.

4.3 One of the major criticisms of the current panel structure is that it discriminates against interdisciplinary research and actively reinforces disciplinary boundaries and distinctions. Most areas of science and technology currently exhibiting rapid growth in the UK are interdisciplinary. A defined method for collaboration between the panels is needed. Interdisciplinary research and collaboration with other institutions should be actively encouraged by panels and, in future exercises, departments should be invited to expand on the interdisciplinary nature of each submission.

4.4 There is concern that experts on a panel could take too narrow a view when assessing individual research areas. It is possible for less impartial panel members to be generally supportive of work in their own discipline but more critical in other fields. If more panellists with an industry backround were involved a more equal approach to assessment may be achieved. Industrial panellists should, however, be working at the cutting edge of international R&D in the relevant area.

4.5 It is important that the selection process for panel members is transparent. The 1996 chemical engineering panel has been criticised for having an unbalanced membership which did not represent all sectors of chemical engineering. It is vital that panel members are actively involved in research in their field and that the panel as a whole represents the breadth of the particular discipline.

4.6 Great emphasis has been placed by panels on the amount of research carried out by a department at an international level. It would therefore be appropriate to have some level of overseas representation on each panel.

5. Number of Staff Assessed

5.1 Opinion is divided over the number of staff members which departments should put forward for assessment. The current system of grading each submission A,B,C, reflecting the number of researchers, is considered inadequate. If departments are to retain the option of putting forward only a fraction of the departmental staff for assessment, the actual number of staff should be reflected in the grading, for example, grade 5(3) where only three staff have been put forward and 5(40) for forty staff.

6. Impact on Departments

6.1 The process of assessment is affecting the system being investigated and there is a danger that university departments are altering their behaviour to succeed in the RAE, even though it may not be in their long term interests. The competition for funding could force too much specialisation within departments; to combat this research could be assessed on importance and industrial relevance as well as on quality.

6.2 There is serious concern that the RAE methodology is encouraging short-termism by driving departments to structure their research and outputs to optimise funding rather than for the long term benefit of the UK. The emphasis on publication diverts academics from the 1993 White Paper objectives of wealth creation and quality of life. More emphasis should be placed on the dissemination and exploitation of research and its contribution to society. Foresight appears to have been almost ignored by panels depite featuring in the assessment criteria.

6.3 The exercise has resulted in a growing transfer market for research staff which is a great cause for concern. Some University departments are poaching leading researchers and in some cases whole research teams in an effort to enhance their research ratings.

7. Dual Support Funding

7.1 Fellows of The Academy are divided on the subject of dual support funding. Although it has been recognised that there is a high degree of correlation between the results of the RAE and the results of research grant allocation from the Research Councils, many are reluctant to see all the funds transferred away from HEFCE. The in-depth quality review system preferred by the RAE panels is seen to be lacking in the Research Council approach.

8. Further Proposals, Recommendations and Alternatives

8.1 Conducting Research Assessment exercises and Teaching Quality Assessments entirely independently is divisive and consideration should be given to combining the two exercises. It would then be appropriate to include all staff in the assessment and the total time and effort would be reduced.

8.2 In future, a rolling programme of assessment should be considered.

8.3 It has been suggested that funding should be related to quality and the numbers of active researchers in the department involved, and should be factored down to reflect the number of researchers who participated in the assessment exercise.

Examination of Witnesses

Professor Mike Edwards, OBE, Principal Engineer, Unilever Research, Professor Barry Evans, Director, Centre for Satellite Engineering, University of Surrey and Professor Tony May, Professor of Transport Engineering and Pro Vice-Chancellor for Research, University of Leeds, the Royal Academy of Engineering, were examined.

Chairman

160. Professor Edwards, good afternoon. Can I welcome you and your two colleagues. The Committee would be very grateful if you could just say a little bit about the Royal Academy of Engineering and indeed introduce yourself and your two colleagues to us.

(*Professor Edwards*) Thank you, Chairman. The Royal Academy of Engineering consists of some 1,000 Fellows, all of whom are elected to the Academy on the basis of their outstanding contribution to engineering in the UK and we have some overseas Fellows who have made contributions in overseas countries too. The remit of the Academy is the pursuit and maintenance of excellence in engineering and to promote the practice of engineering for the public benefit. The input that you have received comes from a cross-section of Fellows in the Academy from all engineering disciplines. The three representing the Academy today are: on my right, Professor Tony May who is Pro Vice-Chancellor for Research at the University of Leeds; Professor Barry Evans, a Director at the Centre for Communications Systems at the University of Surrey; and myself, Mike Edwards, I am Principal Engineer in Unilever Research. We feel that it is particularly important that you are listening to an engineering input in your deliberations on higher education because there is a particular UK problem in making higher education attractive to young engineers and scientists, to maintain the flow of high quality young people into higher education and engineering. It is particularly important to get an input from engineering because it is the engineering industries which are major employers of many of the trained people from the higher education system and it is indeed the engineering industries which will be major appliers of the research output from the higher education sector.

161. Thank you very much indeed. We also thank you for your submission to us. We note from your submission, Professor Edwards, that your Academy supports Dearing's call for an independent advisory council that will help to focus the national R&D spending more effectively. Do you think that if we do have the proposed advisory council it should replace or work with the existing bodies, such as the Science and Engineering Base Co-ordinating Committee and the Council for Science and Technology? Should it work with them or should it replace them?

(*Professor Edwards*) First of all, The Academy welcomes the concept of an advisory council on research policy. I think rather like Dearing feels that there is not a complete understanding of the structures above the research councils that integrate them and pull their activities together, the Academy would like to see a careful analysis of the current position and the incorporation of an independent advisory council but not as an extra tier on top of or alongside the existing activity but a rationalisation of the existing procedures.

162. That sounds like replace rather than work with?

(*Professor Edwards*) Yes, it is not just in addition to.

163. Thank you. Any comment from anyone else?

(*Professor Evans*) If I may, Chairman, to say from the Foresight exercise—I was a member of one of the Foresight panels and am still—we felt it was extremely difficult to find a body at a top level that we could direct our output to which would actually promulgate priorities in research downwards to research councils. I think it could actually play a very important role in allowing Foresight to be carried forward. I think the other area in which I would particularly like to see it operate is perhaps to solve this problem of interdisciplinary research by

[**Chairman** *Cont*]

directing research councils to collaborate more and to fund interdisciplinary research which seems to be falling between the gaps at the moment.

164. I feel certain my colleagues will come back to that point in just a moment. If I may just ask Professor Edwards, again in relation to the need for this body that you think should be a tidying up body rather than an addition or a hierarchy, if there is a need for this body does it not indicate a weakness of the advice from existing bodies? If it does, what are those weaknesses?

(*Professor Edwards*) I think the weaknesses perhaps are revealed in the fact that we are having this debate at the moment. There are improvements that can be made to the current higher education system and the research that goes on within higher education. I think there is a need for improvement there at the higher levels of administration of the system.

(*Professor May*) One of the things that has depressed me most over the few months since Dearing was published is the way in which each of the participants on the research side has been saying, "Yes, there is a problem but it is not our problem. Somebody else can find the funding but we cannot". Bringing together not just the research councils but the role of the Department for Education and Employment, the role of the DTI, the role of the University Funding Councils as well would, I think, very greatly help. There is at the moment considerable confusion in the roles of those different bodies and in their ability to blame one another for lack of progress.

Chairman: Thank you very much indeed.

Dr Jones

165. Would you bring the MoD into this? We heard earlier that that is where the research budget has declined most dramatically.

(*Professor May*) If I could just respond to that. There is the general issue of the research in other government departments which does need to be co-ordinated, in particular the MoD and DERA are a major source of funding, even in decline, and it is worth trying to make sure that that is complementary and not competing with other areas of funding.

Dr Turner

166. I would like to turn to the problems identified in Dearing concerning the full cost of research funding and of infrastructure. One of the suggestions that has been made is that should there not be any fresh money available to address those shortfalls more money could be taken from the Higher Education Funding Council under the dual support system and transferred to the research councils. Would you consider that acceptable?

(*Professor Edwards*) Could I make a comment and then ask my colleagues to join me.

Chairman

167. You are going to give them thinking time, are you!

(*Professor Edwards*) That is right. From my industrial perspective clearly the dual funding system as operated does not work. When I look at universities and their activities they are under-funded for the research that they are asked to do and that has been the case over many years. I think when judged on an international basis our system creaks. There are problems that need to be addressed. From my perspective that can be done either by finding new money or, if one wants to maintain high quality research, and that must be the aim of all of us, we have to do less of it and be more selective. Clearly there is a problem to be addressed there.

(*Professor May*) If funding were to be taken from the funding councils the only way in which that could work, while maintaining credible research, is by significantly reducing the research funding for those university departments which are less successful in research. Whether that is a good or a bad thing is a much wider question. If it were to be taken from the research councils the only way it can be done is by dramatically reducing the number of grants. Neither of those is a particularly attractive option.

Dr Turner

168. I have got a little more questioning on this line. What is your feeling of the size of this problem? What sorts of numbers would you put to it? We have got estimates varying from £110 million to £500 million; it is widespread here.

(*Professor May*) I was interested in the comments earlier this afternoon on the estimation of the full costs of research. Our rough calculations suggest that on average if one takes a figure of 100 per cent of staff costs that is a reasonable indicator of the true costs of the research project. It will vary, as you heard earlier this afternoon, depending on the nature of the project. We take that as a total. At the moment for the research councils we are operating on 45 per cent, with the charities we are operating on about zero per cent, and those between them account for something like 60 per cent of university research funding. One can work up those figures to suggest that in total we are talking about something of the order of £300 or £400 million per annum under-funding which needs to be found from somewhere.

169. Do you think that we should have done all the research that we have done in the past or should we be more selective in terms of Bill Clinton's comment that this is the age of life sciences? What do you say to that, that kind of savage selectivity in Britain for British science?

(*Professor Edwards*) There is no doubt that in the life sciences research is very exciting. As an engineer I would say that unless one has got a manufacturing and engineering infrastructure on top of that that demands a research input then we will not be able to exploit the wonderful bio-science that is done in this country.

Mr Atkinson

170. Can I press Professor Edwards further on his reference to the comparison between this country and internationally when he used the word "creaks". Can he enlarge upon the comparison between this country regarding research and education with the situation more particularly with regard to our competitors? Are there any particular better practices which he would like to draw to our attention that we should take account of?

(*Professor Edwards*) There was one particular exercise that we undertook recently to look at Fraunhofer Institutes in Germany on behalf of the research councils. There are only a few of those highly selective, well directed, but the funding of those institutes outstrips anything that you see in all but the very best in the UK. When you ask the professors there what extra equipment they need they hardly understand the question because if they need something the money will be found if a good case can be made for it. When one contrasts that with the general position in the UK there is a tremendous difference. There are very strong international comparisons and some best practice that we could learn from them.

171. Have we anything to learn from the United States from your experience?

(*Professor Edwards*) In a similar way the USA institutions are working particularly in interdisciplinary areas where there are a few groups which are funded very heavily by the National Science Foundation. One is seeing all countries—Germany, Japan and the States—focusing and focusing and putting excellent resources behind a few key themes.

(*Professor Evans*) If I may just come in and say that from the United States the point of view is that they are much more likely to put considerable resources into centres of excellence. I think that definitely shows benefits in a lot of the engineering disciplines.

172. They are getting out of it what they put in?

(*Professor Evans*) Yes.

Dr Turner

173. How do you react to the Dearing proposals on the revolving loans fund to meet shortfall in infrastructure and equipment? Do you think that will be adequate?

(*Professor May*) The PREST report of a year or so ago which came up with a figure of just under £500 million worth of under-funding of equipment is, we think, about right in terms of the scale of the problem. I have been a bit saddened at the feeling that the loan fund is not workable. In Leeds we have been doing quite a lot of work recently setting up internal charging mechanisms for the use of equipment, for example charging £100 per hour for the use of a scanning electron microscope which is a figure estimated to be sufficient to pay the costs of replacement equipment. It is perfectly possible to devise mechanisms for passing on those costs to research sponsors. If one can do that it should be possible then to repay a loan fund although I think there probably is a case for providing a loan fund at low interest so that that approach is encouraged. I very much agree with the comment that was made earlier this afternoon that it should not be for industry to come up with that loan fund, there should be a significant input from Government or indeed partly from the finance houses with support for their interest repayments.

174. I think you have anticipated my last question. Several industrial associations are suggesting that they are unlikely to support such a fund. Save British Science last week went so far as to say that the proposal is quite implausible. I guess we know what your answer is but perhaps you would like to confirm it?

(*Professor May*) I do not think it is implausible but, as I say, I do not think it reasonable to look to industry to provide the funds to start it off.

Dr Jones

175. Why should financial institutions be willing to put money into this if they are not going to get any return?

(*Professor May*) If we could find a mechanism for the interest on the loans at the rate that the finance houses would be looking for to be paid from another source in order to stimulate the recharging mechanism I have advocated I think that would actually develop among the universities a willingness to seek the real costs of equipment replacement and get the loan fund up and running.

176. But is that not more expensive? The interest charges are likely to be more expensive that way so where will the revenue come from to finance that?

(*Professor May*) The interest charges may be lower if Government provides the capital injection for the loan fund itself to start with. They would be as high if industry did as if the finance house did, as you suggest. One way or another if you are setting up a loan fund interest has to be paid on that loan. What I am advocating is a way of sharing the costs between the universities and the provider of the loan and Government in stimulating the loan.

Dr Gibson

177. Is this a PFI scheme?

(*Professor May*) It could be, I think. I think it is perfectly possible if one thinks of it as a public-private partnership approach.

Mr Gibson: We are familiar with that.

Mr Beard

178. Do you see that the needs of engineering are well covered by the research councils and Higher Education Funding Council's arrangements as in the more basic sciences?

(*Professor Evans*) I think engineering tends in general to require a lot of very expensive equipment. I think one of the things, just harping back on to the loans scheme, is, if we were starting with a level playing field and it was replacement of equipment, there may be some chances of it working. I think we have now got ourselves into a situation where much

[**Mr Beard** *Cont*]

of that equipment needs to be replaced and we need a massive injection of capital to do that. I think we particularly find that in engineering departments.

179. Are you suggesting that engineering would be disproportionately disadvantaged if that problem is not solved?

(*Professor Evans*) I think that is true, yes.

Mrs Spelman

180. Back to the Research Assessment Exercise. If, as the results from your own survey suggest, the RAE is over-bureaucratic and burdensome on universities and it results in an allocation of funding on a similar pattern to that of the research councils, would you favour the replacement of the dual support system with public funding for research coming solely from the research councils?

(*Professor May*) I think not, Chairman. There is a case for providing direct funding to universities for the time of academics in developing research ideas and managing research. If one were to transfer all of that funding to research councils, unless the research councils simply duplicated what the funding councils were doing one would get to a situation where an academic then had to bid for the funds to spend time doing that and one would introduce a greater degree of short-termism, even greater than there is at the moment, in research planning and management.

(*Professor Evans*) I think I would support that and go so far as to say that we really do support the dual funding scheme because it is the only way you really get enough resource into the system to encourage blue skies research and new ideas. Although industry will come along and support particular pieces of work to be done and pay for those particular pieces of work it is the new ideas that are really lacking. If we do erode the dual support system I think we will erode that very important idea of supporting blue skies research and new ideas.

(*Professor Edwards*) Could I build on that briefly because I think from an industrial perspective whilst I have talked about focusing and directing research it is important to get the balance right. I think there is a great need to maintain the amount of funding that we have for blue skies research. Companies like mine wish to direct bits of research and have it directed specially for us but we do want to see new ideas coming from work that we have not suggested, which is new to us, and we can then exploit it in the future. To focus just on short-term directed research without the space for blue skies research would be bad for UK industry.

Dr Williams

181. Is the balance right? The figure I have in front of me for higher education research is £1,000 million from funding councils, £570 million from research councils with a budget in total of £2,500 million, so it is about 40/20 and 40 from other sources. Is that balance right? Given especially some of your comments earlier on about specialisation or selectivity and that in Germany and the United States there are fewer high quality research units, if part of it, say £100 million or £200 million, was transferred from the funding councils to the research councils would that not allow them that greater selectivity?

(*Professor May*) I think we come back to the problem of under-funding of individual pieces of research funded by the research councils and funded by charities. That means that for the amount of research that is now being done the budget is too small. If one could increase the budget to tackle that problem then that would almost inevitably mean the proportion coming from the funding councils would be less because the research council element and the charity element would increase. If one cannot increase it then I think almost inevitably one does have to look for some transfer or a significant reduction in the amount of research funded by the research councils and funded by charities.

(*Professor Edwards*) In your question on the balance I think over recent years there has been a move to more and more directed research, more and more selectivity, to try to balance the books that way. I think we have reached a dangerous limit at the moment where we will start throwing away some of the blue skies research that is good and should be funded. I think the current balance is about right as I see it. Any more of a move to cutting away blue skies research will be very dangerous.

Mr Jones

182. Can we move on to information technology resources. In your submission to us the Academy states: "the cost of IT support in engineering has now achieved a dominant position in research funding and needs to be properly resourced...it is essential that access should be influenced and/or controlled by charging. Free provision has led to seriously inadequate provision." How serious is that lack of provision? Do you really believe that charging is the only way forward?

(*Professor Evans*) I think if you look at all branches of engineering information technology is really all pervasive into those branches of engineering. If you look at all engineering departments and you ask them what comes top in terms of their budget spending on equipment it is IT equipment. I think that definitely IT is incredibly important to engineering. That tends to require massive uses of information technology, large packages, large amounts of computing and so forth. Computing tends to last a very small amount of time, we are writing it off in over three years, so there is a replacement problem as well over time that really causes us severe funding problems within engineering departments.

183. That is because you engineers keep making them go faster!

(*Professor Evans*) Actually that is true. I think in the resource situation in terms of connectivity into external networks we are particularly fortunate in the UK to have had a UK academic network through Janet and SuperJanet through which we could actually connect our services. I think what is not particularly recognised outside the community is that that is very much a service network, it is not a network on which we can do research for future high speed computing. I think that is one of the areas that

[**Mr Jones** *Cont*]
we would like to see enhanced in any future network. I think IT is very important and will become more so in the future. It is something we would particularly like to underline. I think with any external resource of that sort we would very much feel that we should pay for that resource in terms of not misusing it.

184. Dearing recommends that there should be a provision of protected international bandwidth to support researchers. Do you support that?

(*Professor Evans*) I would support that. I think this goes back to international connection bandwidth in terms of future multi-media communications. I would very much support the fact that we do need that for a service network. I would underline again that we need it not only for a service network but for a research network. That is very important to the future of high speed networks within the UK and our ability to link with researches outside the UK.

Chairman

185. Thank you very much. We have finished two or three minutes early. If there is anything that you would like to add to the questions we have asked you or to the answers you have given us for just a minute or two please do so. If there is not, that is fine, we will close. If there is something pressing that any of you do wish to say we would be pleased to hear it.

(*Professor Edwards*) There is nothing I want to say.

(*Professor Evans*) There was one point I wanted to make on funding which I missed. We talked about research council funding and we talked about funding from charitable organisations. The other major source of funding to university departments comes from the European Union through the framework programmes. There we see Government actually putting more of their resource and more of the money spent on UK research through the European channel. It is up to us to try to recover more of these resources from Europe. If you look at university departments they are funded marginally on a 100 per cent basis but are actually only allowed to charge 20 per cent overheads. This is on the assumption that national governments make up the difference to real overhead costs. We cannot recover any additional overheads from any other UK Government sources at the moment. We have this dilemma of being forced more into Europe for research and not being able to recover full overheads by a quite massive extent. I would personally like to see that addressed in terms of perhaps the research councils, perhaps other organisations, making up the difference between those 20 per cent overheads and real cost overheads because otherwise universities will not go for those resources.

Dr Jones: Can I just say I am not sure I have quite understood the point you were making there. There were other points, in particular a charging mechanism for the revolving fund and also charging for IT. I wonder if it might be possible to ask the Royal Academy to give us a note on those points?

Chairman

186. Is that possible, Professor Edwards?

(*Professor Edwards*) Yes, it would be. The response that you have was done rather hurriedly and represents an input from some 30 Fellows. We will certainly respond to that request.

187. Please do not apologise, we are grateful for what we have got. We apologise if we are asking for a little bit more but we hope you can oblige us with it.

(*Professor May*) If I could just come back to a couple of issues associated with the Research Assessment Exercise. First of all, we very strongly endorse Dearing's concern about the treatment of interdisciplinary research. If I can quote an area that I am encouraging colleagues to pursue at the moment, that of sensors technology, one is talking about technologies from perhaps some six or seven different subject areas being applied in perhaps a dozen more. At the moment the Research Assessment Exercise requires that to be reported separately in chemistry, in physics, in electronics, in computer studies and so on. It is virtually impossible to find a mechanism at the moment for presenting the sum total of that research and having it assessed. We have made some suggestions in our submission as to how that could be tackled. We think it is absolutely crucial that it is tackled adequately this time around. Similarly we all share the concern that the Research Assessment Exercise so far emphasises publications as the output of research. If one is thinking about the real beneficiaries of research the emphasis should be on patents, licences, the setting up of companies, payment back through royalties, demonstration of use of the research. That, of course, is extremely important in engineering but it is important across the spectrum. I am very conscious, having taken over my job just after the last Research Assessment Exercise, how many of my academic colleagues were turning round to me and saying: "I have got to publish, I should not be thinking about working with industry because that does not help get brownie points in the Research Assessment Exercise". If we do not tackle that next time around we will be isolating ourselves from the users of research.

Chairman: I am sure you are very right in what you have said but, of course, you could have set a series of mission parameters that are difficult, prepared in a simplistic way of measuring output by papers. If it does not make it wrong I am not sure it makes it right. Dr Williams, do you have a final question?

Dr Williams

188. Having heard so many comments about the Research Assessment Exercise this afternoon and in our session last week, constructive criticism, about the interdisciplinary research, the industrial and how things are measured, I have heard no similar criticism of the research council grant decisions. They have got an excellent peer group structure that has been involved for many decades and I am sure there is unfairness in that but are you as critical of the research council decisions as you are of the Research Assessment Exercise?

[Dr Williams *Cont*]

(*Professor May*) No, I am not. They do look to exploitation and they are increasingly checking that exploitation has happened. If anything there is a problem the other way round, that it is harder now to convince research councils that idea generated research, blue skies research, is fundable but of course you cannot win all the battles.

Chairman: Thank you very much indeed, Professor Edwards, for co-ordinating your team and coming along and Professor Evans and Professor May for helping. We are most grateful to all three of you and to your Academy. Thank you very much.

Letter to the Clerk of the Committee from Mr John Appleton, The Royal Academy of Engineering

I enclose a supplementary memorandum produced in response to questions raised on the 12th November 1997 when representatives of The Royal Academy of Engineering appeared before the Committee. I wish to stress that this supplementary memorandum expresses the views of the three Academy witnesses and has not been the subject of broader consultation amongst Fellows who contributed to the original memorandum.

If I can be of further assistance please do not hesitate to contact me.

1 December 1997

Annex

The Academy is pleased that it was asked to submit written evidence to the Committee and to support this orally when representatives of The Academy met with the Committee on 12th November 1997. As stressed during that meeting, it is essential that the Committee should recieve an engineering input because of the importance of engineers in the UK to wealth creation and social welfare. Higher education in engineering must become more attractive to a greater proportion of the nation's best young people. Furthermore, it is the engineering industries that will employ many of the trained people emerging from higher education. Finally, it is the engineering industries (in the widest sense) that will translate much of the research output of Universities into commercial success. Research into pure sciences alone will not be adequate—it must be matched by appropriate engineering research.

When giving evidence the point was raised of the importance of "bioscience research". It is clear that this is an exciting area where the UK has considerable strength and adequate research funding should be made available. However, the full realisation of this potential will not be achieved unless there are adequate engineering systems to deliver new products and processes on a commercial scale. Of course it is also true that there is much exciting research in the UK which is "non-biological" eg to support aerospace, nuclear fusion, communications, transportation, process industries, etc. All these sectors demand from higher education the flow of well trained engineers and world class engineering research. Without these outputs higher education will fail the nation.

Specific points raised by Committee members on which additional information was requested are addressed below.

1. RESEARCH UNDERFUNDING

While the distribution of costs varies by type of contract, a reasonable estimate of the average indirect costs of research grants and contracts is 100 per cent of the research staff costs. This is the level at which many Universities attempt to achieve cost recovery on industrial research contracts. Taking some approximate figures, the total of roughly £1,500 million in research income for the HE sector includes roughly £550 million from Research Councils, £350 million from Charities and £600 million from other sources. Most of the "other sources" pay full costs, except for the EU which accounts for around £100 million.

The Research Councils pay indirect costs at 45 per cent of staff costs, and these, gross, are roughly 70 per cent of the total expenditure. This suggests an underpayment of around £160 million per annum.

Charities typically make virtually no contribution to indirect costs; making similar assumption suggests an underpayment of around £220 million per annum.

The gross underfunding on EU framework projects needs to be recognised. An EU project allows 20 per cent overheads on the total project costs to the Universities under the marginal costing scheme. It is stated that this is merely a contribution to real costs and that the remainder is expected to be made up from national funds—we presume HEFCE. This does not happen and as a result the average contract is underfunded by around 40 per cent of its value. This suggests a total underpayment of around £40 million.

Overall these three suggest that underfunding runs at around £420 million per annum. We suggest that a fund be set up via Funding or Research Councils to compensate Universities for this shortfall.

Shifting resources for infrastructure support from the Funding Councils to the Research Councils does not solve the general problem. It may appear to increase selectivity but if excellent departments find themselves in Universities that do not have a majority of like departments they will actually be disadvantaged and this will negate selectivity.

2. Equipment Loan Fund

The current position of crisis in the equipment within Universities is due to the continued underfunding of research and was made critical by the 1995 cut in HEFCE equipment grant.

As indicated to the Committee, the PREST (Programme of Policy Research in Engineering, Science and Technology, The University, Manchester) study estimate a backlog of expenditure of £474 million. The Joint Research Equipment Initiative is currently contributing £30 million per annum but requires counterpart funding from industry. It is thus inadequate as a means of tackling the problem, and partial in that only equipment attracting industry support is eligible. At Leeds a charging mechanism for the use of major items of equipment, such as electron microscopes, has been designed to meet the costs of replacement. It is normally possible to pass these charges on to those financing the research for which the equipment is used. This should, if applied more widely, provide an income stream for repaying loans. On this basis it may be possible to attract private finance to establish a loan fund. However, it may be preferable to start with a pilot scheme asking universities to demonstrate its effectiveness before it is expanded. While it would be possible to require the charging mechanisms to finance the interest on the loan, and for this fund to operate under PFI principles, it would be preferable for DfEE to make a contribution, perhaps by making the scheme interest free. However, such a scheme represents a possible way forward only for part of the funding package required for new equipment. It doesn't hide the fact that more money is required to ensure that University research laboratories in the U.K. have the equipment necessary to enable World leading research to be carried out.

3. DTI Funding

The Academy has some concerns on the role of the DTI and would like to take this opportunity to present some views to the Committee. The major concerns are:

(a) the relative responsibilities of DTI and DfEE in producing the White Paper(s) which respond to Dearing (this includes the question of whether research will be dealt with separately from "lifelong learning")

(b) the inconsistency in DTI policy over time on specific funding initiatives; for example four months into negotiations on Faradays, DTI withdrew its support which reduced the budget from £7 million to £4 million.

(c) the incompatibility of DTI and Research Council policy on several major initiatives; eg the Postgraduate Training Partnership, where EPSRC has committed to three years' further funding while the DTI anticipates withdrawal from the scheme.

(d) the difficulty for industry, and particularly SMEs in the lengthy processes involved in DTI schemes, e.g LINK schemes in which decisions take several months and are given with little justification.

4. IT Infrastructure

As demonstrated by the recent IT, Electronics and Communications Panel study in Foresight, IT is all pervasive. This is particularly true in Engineering which has large IT demands in respect of simulation, control of equipment, and in Communications.

The dominant item in all Engineering departments budgeting is for IT and Computing. Academia is struggling to support this need, which is a continuing one, in that equipment is amortised over a three year period and needs more frequent replacement than other equipment. This represents the major item in the academic community equipment infrastructure and is one that is not recognised by the funding bodies. The days when Computing and IT was a central resource and sensibly supported by a separate Computer Board are gone. We are now in the distributed computer era with less need for a central mainframe computer but much more for specialised and localised IT. This falls as a cost on departments and not on the University centrally.

As far as external Communications are concerned we have been lucky in the UK to have the UK University Research Network which has evolved via JANET and SUPERJANET. This network supports external connections for information and for research collaboration. In all academic disciplines the information explosion and the use of the INTERNET and WWW to combat it have led to increased demands on these networks.

Research demands have also increased through the inclusion of video and multimedia and the need for wide-band connections. In this respect the networks have been unable to cope with such high speed requirements. A scheme for charging would stop wasteful use of the resource and we support this provided that the costs for genuine research can be recovered from funding sources. It has been suggested also that there should be a separate wideband research network but this has so far remained unfunded by the Research Councils or HEFCE.

The existence of a research network would stimulate the collaborations both within the UK and abroad which are currently inhibited by the lack of international bandwidth. Dearing calls for "protected international bandwith" to support such work and The Academy would certainly support this very strongly.

WEDNESDAY 26 NOVEMBER 1997

Members present:

Dr Michael Clark, in the Chair

Mr David Atkinson
Mr Nigel Beard
Dr Ian Gibson
Dr Lynne Jones
Mr Nigel Jones
Dr Ashok Kumar
Mrs Caroline Spelman
Dr Desmond Turner
Dr Alan W Williams

Examination of Witnesses

Sir Ron Dearing, Chairman and Ms Shirley Trundle, Secretary, National Committee of Inquiry into Higher Education, were examined.

Chairman

189. Order, order. Sir Ron, may we welcome you to the Select Committee? I think you are no stranger to Select Committees, but welcome to this one which has been newly formulated.

(*Sir Ron Dearing*) Thank you very much.

190. We are very grateful to you for coming along and assisting us with our inquiry into the Dearing Report. I do not think I will invite you to introduce yourself because I feel we all know you fairly well, but perhaps it would be a nice courtesy if I invited you to introduce the person you have brought along with you?

(*Sir Ron Dearing*) Yes. This is Mrs Shirley Trundle who was the Secretary to the Committee and to whom we were much indebted for writing much of the content of the document, so I thought she would be a very present help in trouble if I get into trouble on this occasion.

191. I hope you do not, but thank you very much for bringing her along. Mrs Trundle, you are very welcome. Sir Ron, we have looked at your report with very great interest and during the course of reading it we note that you say that one of the current problems for universities is regarding research infrastructure and equipment. Would you think that was one of the most serious aspects and one of the biggest difficulties for university research at the present time?

(*Sir Ron Dearing*) Yes, I do. As you will have seen from the report, researchers in United Kingdom universities have done a first class job. Although funding has only increased by 14 percent over the last decade, they have maintained a top ranking in world research. They have done this by very strong commitment, sometimes it is feared by giving research priority over teaching, but one of the things that has happened is that in order to maintain this very high rate of effective output, resources have been used for current expenditure, in our view to the detriment of adequate funding for the replacement of infrastructure. Members of the Committee and senior industrialists to whom I spoke were clear that we now had a major problem in a number of centres of world renown which cannot continue to be of world renown unless we replace the infrastructure. May I say, sir, that this is not a problem unique to British universities. I have just returned from a visit to Japan where the Japanese government decided about 18 months ago to double its funding for research because it regarded it as absolutely fundamental to an effective industrial commercial strategy for Japan in the next century and, as part of that, it identified in particular a problem of ageing infrastructure. In Canada, the Canadian federal government decided earlier this year to allocate $800 million over a period of five years to a renewal of the infrastructure of Canadian universities and they hope, with help from the States and industry that that fund will amount to $2 billion. So there is a problem and when one finds it overseas one is confirmed in one's judgment of what we found in Britain.

192. Sir Ron, without doubt there is need for adequate and substantial long-term funding for research in Britain and British universities for the reasons that you have just mentioned and clearly our overseas academic competitors, if we may put it that way, think the same way. But that said, do you think there is also some need for some urgent stop-gap funding for infrastructure to check the decline that seems to be prevalent at the moment?

(*Sir Ron Dearing*) I do think it is urgent and you may recall from the report we came up with a proposal of a revolving fund of £400 to £500 million. Now on the quantum of that, as I went round to a number of large concerns hoping to interest them in contributing to this, there was no debate about the need for a sum of that magnitude. In fact they would push me to the top end of that range. It is urgent if we are going to maintain our standing to avoid losing research contracts to overseas countries. Big firms have said to me: "Dearing, we are global operators. We have no need to see ourselves located in the United Kingdom. We have no need to see our research base being in the United Kingdom. We are attracted by the contributions we have had, the relationships have been excellent, but unless something is done you cannot be sure that we will stay here." So in that sense it is urgent. It is not just infrastructure, it is equipment too. Our evidence was that there is a backlog of investment in infrastructure of, I think the figure was £475 million and although an effort is being made through a special fund

[**Chairman** *Cont*]

producing £50 million a year to address that, the problem is both serious and urgent. I think we are talking about something that is fundamental to the long term competitiveness of the United Kingdom and if I have any comments on our recommendations in the light of what I find by looking around, say in Japan or hearing about Canada, we did not at all overstate the magnitude or urgency of the issue.

193. My last comment, Sir Ron, before I ask Mr Beard to ask a question: would you say that if we do not have some fairly urgent funding now to help the infrastructure and equipment, future generous funding for ongoing research could be, to some extent, wasted or misapplied because we have lost the base?

(*Sir Ron Dearing*) It will not be used as effectively as it should be. If you are working in a building which was designed for a different purpose and the infrastructure is aged then you are not getting effectiveness out of the equipment and the first class people you are getting in. The nature of some research—I say this with respect to those who are researchers and understand these things in a way that I do not—if, say, research in biology has turned from the whole organism to microbiology and the gene, then the kind of infrastructure for one is not apt for the other.

Chairman: Thank you very much indeed. Mr Beard?

Mr Beard

194. Sir Ron, your solution to this was a proposal for a revolving loan fund subscribed to by industry, but industry seems to be unenthusiastic for it, as do fundamental research charities. Is the scheme still workable and what could be done to persuade industry and the charities to contribute?

(*Sir Ron Dearing*) It would be an astonishing thing if the charities and industry said: "What a good idea. We are keen to contribute", so it is the natural reaction one would expect. When I went round—and I did go round to several—I think it is fair to say that the reaction was, in general: "This is bad in principle; it is the Government's job to provide the infrastructure. However, Dearing, we will give you a hearing and without commitment we are prepared to talk about the detail, but do understand there is no commitment". I only met one major charity—well, I asked and they gave me a decent dinner—and I thought when I left, if the Government showed that it was very serious about this and it was prepared to put its own hand in its pocket—and without that, there is no basis for proceeding—then I think industry in certain areas of high technology realises there is an issue that needs to be faced and I would be very disappointed if, out of enlightened self-interest, there was not some response. It may be it has to be structured in a rather different way. We have said there is a general pot and it is available to five star research laboratories only and maybe they want to make it much more specific so that instead of it being a general pot it is for a particular project, but I would be very disappointed, in spite of the very natural reaction one would expect, if the Government did not work hard to encourage more funding because one knows how very tight funding is.

195. Indeed. Do you see any particular thing that could be done to persuade industry?

(*Sir Ron Dearing*) Well industry always say, if there were tax breaks, but the Chancellor would say: "Well, what else do you want?".

196. But I think the response is also that industry traditionally has supported the area of its own infrastructure and they cannot control where the funds are going if they are put into a big pot?

(*Sir Ron Dearing*) That is right. I think there are particulars. It is on the basis of funding contracted work. As you may well know there is a formula which is generally used in government circles for current overheads. It is currently 45 percent of staff costs and we recommended it should be 60 percent. I think people in industry are naturally inclined to think: "Well if 45 percent is the Government figure, that is all we are going to pay". In some cases it ought to be 100 percent. I think that issue needs to be opened up in a big way with industry, and with charities, so there is a full contribution to overheads. I think the European Union projects are only funded to, say, 20 percent. That needs to be topped up, perhaps by the Government. So if you cannot get the money one way you must start getting it other ways, but the trouble is, Chairman, this will not produce the quantum that is required in short order. If the university is going to have to borrow this money they must have an assured income stream and that means a long term contractual relationship with companies rather than short term ones and one of the themes of our report is partnership. We do urge in our report industry or companies to have a strategic relationship with universities and this is the kind of area where major corporations might seek to form a long term relationship with departments of great distinction.

Dr Jones

197. A few minutes ago, Sir Ron, you said that in Canada they were hoping to increase their fund to $2 billion as a result of collaboration. Is there any evidence coming from Canada which might guide us in the likely outcome of your revolving fund?

(*Sir Ron Dearing*) I have not had it. I am relying on reports I have read rather than going to Canada to find out. Their hopes have been from the state governments and from industry, but I have not heard how far they have got. It is quite a recent initiative.

Dr Gibson

198. Is it happening in the United States as well?

(*Sir Ron Dearing*) Well of course there is a great tradition there of industrial partners, but the percentage of research funding from industry in this country, which we calculate at £180 million, which is about 5 or 6 percent, is roughly the same as contract funding in the United States. Where there may be a difference is that there is a much greater tradition of endowments at the universities. There is a great tradition of giving which we do not have on that scale.

Chairman: Dr Williams has a supplementary.

Dr Williams

199. The revolving loan fund; do you envisage that that will be one pot of gold nationally or would there be a sort of regional or perhaps institutional structure?

(*Sir Ron Dearing*) We have thought of one pot of gold and as soon as one complicates it, it becomes more difficult. What is more, there has been a strong view amongst the university community that it is best to handle research nationally so that they are all part of the same research community. Now I have no doubt that in particular circumstances, say in Scotland and Northern Ireland, there might be particular firms—perhaps not in Northern Ireland because there are so few sizeable firms—but I judge in the areas where the need is greatest, which is biochemistry and pharmaceuticals, it is mainly the national corporations which should give the greatest opportunity. But it may be a relationship, as I was suggesting, between particular corporations and particular great departments of universities which may an alternative way forward.

Dr Gibson

200. I would like to take it on a bit. How we are going to get this money that you recognise is needed? You make some exciting observations. Now if the Government did accept your recommendations regarding student support say, and alterations to the way that the PSBR was calculated—that is, the loans are not treated the same way as grants—that might loosen up the money coming from government. Would there still be the need for industrial investment into this loan fund?

(*Sir Ron Dearing*) If I remember rightly, the Labour Party in its manifesto said it did not see more taxpayer money coming into higher education. The priorities, and I understand that, are elsewhere. Therefore we say in our report that we need a multipartite approach to this problem with the students making a contribution—25 percent of tuition fees we said; the Government have modified that but the principle is the same—the Government coming in itself and universities coming in by continuing the admirable progress they have already made to new approaches to doing things and getting further effective. And there is scope, but if I may say, Chairman, we were concerned that the Government inherited proposals which were pushing the rate of reduction in unit cost too fast and what we wanted was time for the application of mind to new thinking of ways of doing things, but it is a tripartite approach.

201. So what about this PSBR initiative? Can you say something about that, because that sounds exciting, does it not?

(*Sir Ron Dearing*) It does seem extraordinary to me as a matter of accounting that a grant is treated in the same way as a loan, even though there is a higher expectation that a large proportion of the loan would be repaid and one could place a value on the discounted present value of the realistic repayments. We found in the Netherlands that it had been established there for Maastricht criteria purposes that the kind of accounting which we advocate in our report should be adopted. It does seem to me, may I use the word perverse, to treat a grant as a loan and I am hoping that the Treasury will agree to change that practice although in a way that is measured and does not disturb confidence in public accounting, which is an important consideration and one which I understand.

202. No reaction from the Treasury so far?

(*Sir Ron Dearing*) I did see the Treasury and like industria they gave me a good hearing—

Chairman

203. And a good lunch?

(*Sir Ron Dearing*) No, I had to give them a biscuit; there was no free lunch! And I think the Treasury is in the market to change but not precipitatively. I would like to accelerate that because it seems a self-inflicted problem.

Dr Turner

204. Just as a rider, before I go to my main question, I would be interested if you have any paper about the Dutch accounting process?

(*Sir Ron Dearing*) No, all I have, and I would have to go to the archives, is a letter from the Permanent Secretary confirming what they told me. It is a very short letter and perhaps Mrs Trundle, you could retrieve that from the archives?

205. I just ask because after this meeting I am going to have a meeting with the Paymaster-General and argue with him a bit about it?

(*Sir Ron Dearing*) There is no doubt at all, sir, we went—a gang of us—to the Dutch Ministry and after a meeting with the Minister we met his top officials and this was a particular issue we pursued with them and I was concerned to get it in writing and I got a brief letter confirming it.

206. That is interesting, but to come to the question of overheads which you have already touched on, your report argues that the indirect cost element, from whichever source of finance, should be raised to 60 percent or even higher and you suggest that this would be an incentive to universities to examine and understand their costs more accurately. What evidence do you have to suggest that this would, in fact, have this effect on universities? Do you think that universities do not understand their own real costs?

(*Sir Ron Dearing*) First, it is not a straightforward matter always to assess indirect costs in any organisation and it has not been part of the university tradition to go in for a close allocation of costs. I think that is a fundamental problem to optimum decision taking—for example, in optimising the use of accommodation when it is on free issue, as it were. We felt that if the universities had legitimate grounds, and if they produced the costing information when winning a contract from a research council or industry or a charity to get more than 60 percent, then that would be a good motive. Universities naturally do not want to get information for the sake of it, but if it can result in gold then they will do it.

207. And what is your feeling about the use of the staff cost percentage?

[Dr Turner *Cont*]

(*Sir Ron Dearing*) It is rough and ready; we know it is rough and ready. It is imperfect, but often with these things one has to go for something reasonably simple to get progress and we have got to something and we know it is imperfect and it is an approximation, but it is a better approximation than the present one. This came from an independent firm of accountants who were consulted, who were put to work on this.

Chairman

208. Just on that point—excuse me, Mr Turner—you would not think it was worthwhile the university putting a lot of effort in to change that system? It is rough and ready and you are implying, I think, rough and ready and by and large good enough?

(*Sir Ron Dearing*) Yes. Given that there was this survey by a firm of consultants there is something on the table which has, I believe, the confidence of the community. Believe me, I think they would rebel if we came up with something very complicated which required a great deal of work to calculate.

Dr Turner

209. If there is no new money forthcoming to address this overheads problem, would you favour a further transfer from the funding councils to the research councils so that research councils could fully fund projects or would you want to see greater selectivity in projects which were funded?

(*Sir Ron Dearing*) The Committee did offer the three options but made clear which was its preference and the Scottish Committee made clear it did not wish to proceed at all unless there was extra money. Now I do want to emphasise, Chairman, the extra money. I said over ten years there has only been a 14 percent increase in funding for research while the number of students has doubled. The productivity has been going up, while in other parts of the world—and I have looked up figures—it has been going down. They have a tremendous track record. When somebody has a great track record and it is important for the long term national competitiveness, I think it is good business to put in more money. Now we did not come up with, say: "Go on, let us propose X", but it seemed to us that there was a very strong case for extra money and this is one way. We are not talking about $800 million or Japan doubling—and they are talking about trillions of yen—we are talking about a reasonable sum. So I would prefer not to be led down that path. I said earlier on that I am convinced we did not overstate, I think we understated, the need in the case and therefore I prefer not to choose between two things which I think are very third best.

210. Do you feel it would actually be destructive in the long term to transfer more money to address the problems?

(*Sir Ron Dearing*) No, I think it is right in principle, because look, the dual funding system has produced good. There is a general feeling that it is a right structure, but because the Research Council projects are not being properly funded by them because they do not have the money, we have got into a situation, to which this is contributory, of under-investment in infrastructure because the money has not been coming through that channel. So I do think it right that the money should come through the Research Council to fund the Research Council approach. I do not think we should mess about any more. I think it should be clear cut and the money should come. You could say I have driven myself to choosing one of your options, but I do not want to. I want to fight for what is right.

Dr Kumar

211. Sir Ron, may I just turn to—I think you touched on it slightly—the Higher Educational Funding Council? You may be aware that the Save British Science organisation have argued that, in the current problems generally in research funding, inadequate support comes from the Funding Council not the Research Council. Do you agree with them that that is the case?

(*Sir Ron Dearing*) That inadequate funding is coming from the—?

212. That the Funding Council, not the Research Council, was to blame for it—the dual support system?

(*Sir Ron Dearing*) The dual support system. Well, they can only allocate what they are given by the Government and as you know the greater sum comes from the Funding Council rather than the research councils. I would agree that there has been inadequate funding, point one. I would go on to argue that it is urgent that the problem should be addressed. I would argue that the first calls for extra funding are (a) the extra money for the research councils £110 million, (b) extra money for equipment through the HEFC—and we are talking about a £475 million backlog—and money from both to this revolving fund. So I am asking for a multi-stranded approach.

213. May I just press you on that? To what extent do you think the result of this is a real decline in this research funding, the funding councils?

(*Sir Ron Dearing*) I tried to check out the figure that this 14 percent is an increase in real terms but in relation to the size of the university student community which has doubled it is a very real decrease. Now I am not arguing for a moment that there should be a *pari passu* increase in research funding because we are not arguing that all academics should be engaged in research. We argue that some should concentrate on scholarship. But it does seem extraordinary to us that when there has been this research explosion, when it is not only a question of the research we do ourselves but the access it gives—we do 5 percent of the world's research—to the 95 percent done by other people—and it must be a national imperative to tune into that and for universities to act as a channel to the rest of the community, particularly industry.

Mr Beard

214. Do you see, Sir Ron, that the proportion of research money spent on curiosity research, which generally comes from the Funding Council, is being eroded (a) because the universities are directing it to

[**Mr Beard** *Cont*]
make up for the teaching budget and (b) because they are directing it to make up for the deficiency in infrastructure?

(*Sir Ron Dearing*) No, I honestly do not think there has been a transfer to the teaching budget from the research budget because of the high value the academic community places on research, so I do not think that that has been happening.

215. But it has been happening the other way?

(*Sir Ron Dearing*) It may have been, yes. Look, if you have a culture in which research is esteemed and teaching is often more of a duty and if your promotion prospects are linked to research rather than teaching and if it is exciting, then it is natural that you should give what time you possibly can to your research. One of the main concerns we have in this report is to raise the standing of teaching to be a great profession in its own right and we argue that since we must be a knowledge based society the relative competitiveness of the nation will depend to some extent on the excellence, relevance and quality of its provision for teaching, so our concern is rather the other way around. However, may I just pick up what may have been in your mind, although you did not say it explicitly, has there been a diversion of money from curiosity driven research to the more practically oriented?

216. Yes?

(*Sir Ron Dearing*) Now one of our arguments, Chairman, is that research is so important that we must have clear streams for particular purposes and I think there is support for that, and one of the streams is for applied research and collaboration with industry and therefore we propose the creation of an Industrial Development Partnership Fund which would bring together many smaller schemes into one. We argue that the Government funding for that should be increased from its present £50 million over a run of years to £100 million. We do think that is important because one of our inherited problems is the problem of increasing the transfer from basic research into its applications. We are anxious to get more collaborative working between industry and universities to their mutual benefit. One of the things that struck me about Japan is the way in which they are positively seeking to put government money into first rate laboratories which were jointly used by industry and academe.

Dr Williams

217. I would like to ask you about the Higher Education Funding Council? You draw attention in your report to the Research Assessment Exercise and the way that interdisciplinary research or co-operative research is unfairly accounted for. What can be done to try and improve this?

(*Sir Ron Dearing*) We found that there was growing anxiety that at least some of the exciting areas of research do not lie neatly in the traditional boundaries of the departments and there was a concern that since the money comes from that research council, or that research council, or that research council there was no really good mechanism for supporting multidisciplinary research, and indeed within the universities, too, these tend to be departmentally organised. Now having identified the problem we said this was such a major issue that there ought to be an independent investigation of the best way of cracking it, for example by the Royal Society and we recommended that the funding councils and the research councils commission a review of how to meet the very real need to facilitate multidisciplinary research.

218. Is some of that research of more application in terms of industry, or rather, if it was more fairly treated in the Research Assessment Exercise, is it likely that it would then attract more funds from private sources?

(*Sir Ron Dearing*) I cannot say that, but I am conscious that in industrial applications cross-discipline research, for example between information technology and linguistics of all things, are very relevant and they are poles apart in the university community. The philologists and the computer people and yet as Professor John Laver's report on the humanities shows, this is a cross-disciplinary area which is very fruitful and that has very definite practical applications in the effectiveness of a computer programme and that of course is a huge area of expansion in industrial business.

219. Finally, generally for British research is the only really effective way of maintaining our very good record one of increased public funding at the end of the day?

(*Sir Ron Dearing*) First, we must as I have argued repeatedly have extra funding, but there is more to it than that. Second, we must foster the well being of the academic community itself, that is career management, personal development, the research students. There was a recommendation, in fact it has happened, a new protocol, as it were, a charter of rights, for good practice for postgraduate research and we argue that the quality assurance agency should establish and service such a standard and, if you like, kitemark for good practice. Then we believe strongly that if we are going to get the best value for money we must continue to concentrate what resources are available on excellence. So it is not just more money; we do believe we can get greater effectiveness through a range of supporting activities.

Dr Jones

220. In relation to additional public funding, a few moments ago you seemed to be recognising that this was not a priority for the Government. Obviously there will be additional money raised through the abolition of the maintenance grants and fees and loans, although there is a problem about that coming through. But I am confused as to whether you feel that resources from that part should actually be allocated to research and if not where is the additional money you are advocating going to come from?

(*Sir Ron Dearing*) My own view on that is that these tuition fees are coming from undergraduates who are not engaged in research and it seems reasonable, having asked these young people to contribute, that it should be used for purposes for which they are engaged. You could argue, well of course research enhances the quality of the teaching,

[Dr Jones *Cont*]

but I would not wish to push that argument too far. So I think the money, as we argued with the revolving fund should come from industry, the Government, charities and the Government, in my view, has to be a prime mover because unless the Government will, others will not, because they do see—

221. Does that not contradict what you were saying a moment ago?

(*Sir Ron Dearing*) In what respect?

222. You are actually saying that the Government has to put real terms increasing into the funding for research—

(*Sir Ron Dearing*) I am.

223.—of the order of £400 to £500 million.

(*Sir Ron Dearing*) I do not have the figure in the front of my mind, but over a long run of years we are talking of £1,000 million from Government. We do not accept a view that society as a whole should not contribute to the further growth of higher education because society as a whole benefits from higher education. So we saw a three-way split of the responsibility; the student when he or she graduates and has something to contribute, the universities through increased efficiency, the Government and, increasingly, industry.

224. In your view it should be a priority for Government to increase funding?

(*Sir Ron Dearing*) I do indeed think it is an urgent matter for the Government to address this problem of research infrastructure and equipment. I think that is more important than expansion of the volume of research. We must maintain its underlying quality. We have pushed and pushed the assets we have and there comes a point where, in my view, it is dangerous to continue expanding the use and let the infrastructure continue to decay. That would be bad policy and it would be very costly policy. So I think the urgent thing is to address the backlog of underfunding of the past.

Chairman: A quick question from Dr Kumar before we move on to another subject.

Dr Kumar

225. Sir Ron, may I just quickly ask or just explore that, are you saying to me that the commitment in other countries—a couple of them you have given—for research funding is greater in those countries from public funding than the United Kingdom or if there is a league you can tell us that exists we would be very interested in that?

(*Sir Ron Dearing*) I mentioned those two countries mainly to illustrate that the problem of infrastructure is not unique to this country and to support the persuasiveness of the case that I made. I am impressed by the strategic judgment of the Government of Japan that the future of Japan in the next century is linked to investment in research and that it is, in consequence, doubling investment research. Now you said the league table; I think in chapter 3 of our report—am I right, Mrs Trundle?—we have a table which shows that Japan spends 2.7 percent of GDP on R&D. We spend 2.2 percent. I think we are number five out of 97 countries. There are not huge gaps, but to be five out of seven, I think, is strategically not the right position for Britain. A country that is not in our league table—it is the G7 countries we have got—is Sweden and I went across at their invitation and I cannot remember a figure, but it is a far higher proportion of GDP that is being invested here because they see the only future as being in knowledge based industry and commerce. It seems to me that the United Kingdom has nowhere else to go in the next century. When I contemplate the implications of 40 percent of the world's population moving into the world's market places like the Indian sub-continent and China, China is planning to have 100 world class universities and if that sounds rather large its population is 20 times ours and that is the equivalent to us saying we want five. They mean business. At lunch I was sitting next to the Deputy Prime Minister of Singapore and I was saying to him: "Look, you are pretty near China. What is your strategy?" He said: "Look, there is no future in fighting it out toe to toe. We have to be 10 to 15 years further up the learning curve" and that is their strategy and I think it is the only strategy for the advanced world.

Chairman: Well, you have stressed that very strongly, Sir Ron. Thank you very much. We are moving on now with Mr Jones to I think arts and humanities.

Mr Jones

226. Yes, I would like to turn to the part of your report where you propose the creation of an Arts and Humanities Research Council because you point out that the current funding mechanism at the moment for arts and humanities puts them at a disadvantage because they do not have a direct involvement in higher level discussions about research funding and policy. We have had a statement from the Chancellor yesterday and some questions to the Prime Minister today which indicate that the Government is going to keep a very tight rein on the public purse. So assuming that new money will not be available for this new research council for arts and humanities, would you favour a transfer of fundings from the funding bodies of other research councils or from both?

(*Sir Ron Dearing*) You have heard my response earlier on not to be tempted into second best, but what we are talking about is £8 million in the first year, an extra £8 million the second and an extra £8 million in the third. In relation to the scale of the arts and humanities this is very small money indeed. I do not think this is, in terms of what the Chancellor has to wrestle with, more than small crumbs off the table. I do think, and Professor Laver's annex to the Report—I think it is Appendix 3—does bring out that great though the arts and humanities are in their own right they do contribute in a major way to the national economy. I think he argues that the employment in the culture industries is 800,000; the theatre, music, the art galleries, the museums, the libraries, the entertainment industry generally. Tourism is a huge industry and the arts nourishes it and I do think it is a good investment. So in our report we argue for extra money, not for a transfer. Yes it could be transferred from the others. You could argue that if their total funding for the sciences is over £2 billion from all sources, to transfer £8

[**Mr Jones** *Cont*]

million, £8 million would not be much, but given what I am saying about the underfunding in the past and the backlog, would it make sense to do these transfers? So my answer is yes, it could be done, there is an argument for doing it, but I think we must face up to the issue of additional funding for research.

227. Do you think that the Arts and Humanities Research Council if we get it set up should be part of the structure of OST as suggested by the Committee of the Chancellors, Vice-Chancellors and Principals or would it be more appropriate in another Government department with closer links to the relevant subject matter and, if so, which?

(*Sir Ron Dearing*) I think there are arguments both ways. We argue for it to come with the other research councils so they are sitting around the same table arguing together. I think, if you recall our report, the low level of funding for the arts and humanities from the Humanities Research Board—£21.5 million a year, of which £19 million goes to scholarships and burseries, leaving only £2.5 million for advanced research projects in this country. The reason why it is so small is partly because the HRB has not had a seat at the table. It is just that it has been out of sight, worthy but not in the room where the decision was taken.

Mr Atkinson

228. Sir Ron, can you explain the distinction made in your report between public and private research? I ask this partially because I have located in my constituency the Anglo-European College of Chiropractics, a private sector college. I believe Professor Pleger, the Principal, actually made a submission before you to consider in drawing up your report and of course he is very concerned that private sector research undertaken by his College is neither recognised nor encouraged in your report?

(*Sir Ron Dearing*) Perhaps given the problems we have of funding public sector institutions you can understand why I did not recommend. You asked me what is the difference between public and private? This is something members of the Committee picked up during a visit to the United States. There, there are a large number of institutions which do not see themselves as engaged in research. They see themselves as first rate teaching institutions, but in those institutions the members of staff teaching at degree level and above are expected to keep at the forefront of their subject. So although they are not engaged in big ticket research and not in strong research departments, each scholar has his own area of scholarship and there is support for it. We argued that this personal research - keeping abreast of your subject, analysing it, synthesizing, cross-discipline and material, reaching conclusions about it, is something that should be fostered to improve the quality of teaching and in our report we do urge that this is recognised as a need to ensure the quality of teaching in departments which are not research oriented, but we do say—and this is an important point—that there should be wide open arrangements for departments which are engaged in research to welcome academics from another institution which is not engaged in research where they have something to contribute as a full and equal member of that research community. That again is an idea we have picked up from the United States and we recommend accordingly.

229. May I then press you on your definition of scholarship? Should this be applicable to all subjects or should it be appropriate for researchers in the humanities field?

(*Sir Ron Dearing*) I speak with some diffidence amongst those who have engaged in scholarship and research and I have not, but we took the view that scholarship is necessary to underpin all research, that in the arts there is not a real boundary between scholarship and research, but essentially research is committed to finding out things that are not at present known whereas scholarship is concerned with the lecturer being able to keep up with the leading edge of knowledge of his or her subject and not just reading it passively, but looking at it critically and creatively, but not trying to establish new knowledge. It is the foundation of research but also the foundation of excellence in teaching.

Chairman

230. Does that apply to chemistry and biology as well?

(*Sir Ron Dearing*) Yes indeed, it certainly does.

231. The foundation of scholarship is to look for promising areas for research?

(*Sir Ron Dearing*) Yes indeed.

232. And it is a continuum in all sectors?

(*Sir Ron Dearing*) Absolutely.

233. And scholarship to the research is a continuum?

(*Sir Ron Dearing*) Yes, it is a continuum.

Chairman: Thank you very much. Dr Jones?

Dr Jones

234. Before I pass on to the matter I am supposed to raise with you, may I just continue and say that I think you were advocating £500 and other witnesses have suggested that this is a trivial amount and that in actual fact funding should be included in the allowances made in funding for teaching? Why are you advocating a separate pot and is your £500 just for science-based subjects or is it for everyone?

(*Sir Ron Dearing*) It is in addition to what is there at the moment. We are saying that all academics should be engaged in keeping up with their subject and the arrangements at the universities facilitate that, but we would like to strengthen that and we are saying that to encourage departments that do not have any legitimate high aspirations of doing well in the Research Assessment Exercise, instead of devoting much energy—as they do—to achieve probably small sums or no sums, there should be an opportunity for them to opt out of the Research Assessment Exercise and to that end we should create a fund of about £30 million which would be provided by releasing money gone to low rated research. This would be available for those who opt out of research assessment to support their scholarship.

235. Self-financing?

(*Sir Ron Dearing*) Yes.

[**Dr Jones** *Cont*]

236. A bit of money from research?

(*Sir Ron Dearing*) Yes, a bit of money that would come out of the research pot. It is not extra money this time.

237. Okay. Turning to the Industrial Partnership Development Fund which you mentioned earlier, why are you advocating the creation of a new fund? I understand the need to actually pull together the various different schemes, but could you not perhaps take one of those schemes, like the LINK scheme which is well established and understood and actually expand it and bring the other schemes into its umbrella?

(*Sir Ron Dearing*) I would not object to that at all. What we were saying was that there is a tendency for Government to come up with new initiatives all the time and what is needed is something that is straightforward and has a long shelf life so that people, including in particular people in industry, can get used to it and if you want to piggy-back it onto the LINK scheme or one of the other schemes, fine. I think we want to have quite wide terms of reference.

238. And you want new money to be added to it?

(*Sir Ron Dearing*) Gradually. We do not say £50 million right away; we say over a period of years. Of course it is dependent upon getting equal funding from industry, so its rate of growth would depend upon the success the institutions are trying to get.

239. Industry would come up with their share?

(*Sir Ron Dearing*) I think the fact that we are getting £180 million at the moment from industry shows there is a basis for proceeding and what I learnt of academe is that there is nothing more persuasive than money and if there is money to be got by performing in a particular way then that is powerfully influential.

Dr Gibson

240. Is that the view of the people on the Research Committee who have had experience of industry?

(*Sir Ron Dearing*) Well, we did have people with experience of industry and they made this recommendation.

241. It came from them?

(*Sir Ron Dearing*) I cannot remember who was the originator. You know what it is in a Committee; an idea develops. But there was strong support for this idea, linked also to the need for clarity about the distinctive purposes of research and a clear funding formula, yes.

Mr Beard

242. Why would you expect this to be more attractive to industry than the present arrangement that many industries have of financing individual projects, because in this scheme there is no way in which the industry could influence what it was used for?

(*Sir Ron Dearing*) No. We are talking of, if I may just clarify, two different things here. One is the infrastructure scheme and we have agreed that there may be more than one way of approaching this. This one is very specific. It is money from firm A for a clearly defined joint project with university B, so I think there is a good basis for proceeding. The record of the universities in getting more money from industry for research is good. I think it is right that the old universities, that is pre-1992, have increased their money from industry by over 80 percent over the last decade, so it can be done.

243. If it is specific like that, I am not quite sure what is new about it because industry does that already?

(*Sir Ron Dearing*) What is new about it is first saying to Government: "Please stop one initiative after another. If you want industry to collaborate it has to be stable and long lasting. Second, as long as industry is playing the game and showing it means it by putting its own pound notes in, you should be prepared to put more pound notes on the table, too." Those are the two new things.

Chairman

244. Sir Ron, we have come to the end of our time, but we have had a most fruitful and interesting session with you. We thank you very much for coming to the Committee. We thank Mrs Trundle for being a strong, silent support by your side. You finished up your evidence just then talking about the need for extra funding that will help in the future and if I may just confess I did toy with your name in one of our sessions a week or so ago when some of us made the same suggestion and I said: "That must surely be known as Dearing gearing"! I hope you will forgive me for that and I have now bared my chest and confessed it. Thank you very much indeed. Congratulations on your report, your latest report, because you have quite a volume of reports now, for which we are very grateful. Thank you for being with us and I hope that you might enjoy or benefit from reading our report in due course as much as we have enjoyed and benefitted from yours.

(*Sir Ron Dearing*) Thank you for giving me a hearing and I look forward to reading your report and hoping that perhaps we influenced your thinking a little.

Chairman: I am sure you will have. Thank you very much indeed.

Memorandum submitted by the Confederation of British Industry

INTRODUCTION

1. The CBI welcomed the publication of the report of the National Committee of Inquiry into Higher Education (NCIHE) and recognises the serious attempt made to address the current problems related to funding research in HE and to suggest mechanisms to ensure that excellence is sustained into the next millennium. However further consideration should be given to a number of recommendations before being implemented.

2. Institutes of Higher Education play an essential role in underpinning the competitiveness of the UK. They do this by providing the well-trained individuals required by industry and by sustaining the long-term research capability of the UK. Whilst industry often seeks expertise in universities to assist with solving short-term problems, the greatest value of research undertaken in the higher education sector is the ability to look further into the future and develop new and emerging areas of science, engineering and technology.

3. There is a need to balance basic, strategic and applied research—basic research is an essential element and the best scientists and engineers must be given the opportunity to pursue areas which may appear far removed from any immediate application. Placed in a strategy where collaboration with industry and exploitation are seen as positive outcomes, this long-term, often speculative research can lead to significant breakthroughs.

4. This Memorandum draws on consultations with members of the CBI's Technology & Innovation Committee and other meetings with Chairmen and Chief Executives of CBI member companies.

RESPONSE TO SPECIFIC QUESTIONS FROM THE COMMITTEE

Proposals for an independent advisory council on national research policy

5. The CBI is not convinced that an additional body is required to advise Government on the direction of national policies for the public funding of research. Clarification should, however, be brought to the respective roles of the Council for Science & Technology and the Foresight Steering Group. If the former is intended to be the premiere advisory group, it should be made more independent by ensuring that the Chairman is at a senior level outside Government and that it consists of leading industrialists and academics. The advice of this Committee must be made public and the Government required to respond. The Office of Science & Technology is currently consulting on the shape of the next Foresight survey in the year 2000 and any changes made to the role of the Steering Group should be complementary with any implementation of Dearing objectives.

Funding for research infrastructure

6. UK industry looks to the higher education sector to sustain high quality in the science and engineering base, both in terms of research and development of well-educated and trained individuals. Many CBI members have expressed serious concerns regarding the deterioration of infrastructure in our leading university research departments and that reductions in funding are now threatening the quality of the research base.

7. In order to solve these pressures on the current funding system, there should be a significant revision of the UK's research funding system to ensure that the finite resources available in the UK are focused on sustaining our best researchers. However, this must not be seen in isolation—academics must be able to communicate with industry and be open to dialogue. Since the publication of the 1993 science, engineering and technology White Paper, *Realising our potential* and the initiation of the Foresight exercise this dialogue has increased dramatically. This relationship should continue and research in collaboration with, or of relevance to, industry should be seen in equal stature as that which leads to academic publications.

8. The CBI believes that any future developments of the funding system should ensure that:

- research funding is focused to ensure excellence;
- funding is allocated to reduce dilution of finite resources;
- funding mechanisms are clarified and institutes of higher education encouraged to realistically cover the cost of research; and
- university departments who do not carry out research at national or international level, are encouraged to support local industry through the provision of applied research and training, and engage in scholarship to inform teaching.

9. The CBI believes that the Government must look at its overall investment in research and development and that the recent decline should be reversed. The investment has dropped, in real terms, from £6.8 billion in 1987–88 to £5.6 billion proposed for 1997–98 using 1995–96 as the base year—figures from the 1997

Government Forward Look). The CBI[1] has urged the Government to sustain investment in our science and engineering base at £6 billion—this restoration should be a high priority for Government as it develops future spending plans. The additional £400 million should be used in a focused way to reverse the deterioration in infrastructure of our leading research universities.

The future of the dual-support funding system and the role of the Research Councils and Higher Education Funding Councils

10. In order to clarify funding streams and ensure that finite resources are focused towards excellence and relevance the CBI recommends that:

- monies allocated to support research through the Funding Councils are transferred to the Research Councils;
- the Research Councils should fund Centres of Excellence on a five-year rolling basis;
- universities realistically cost their research to cover the total, including provision for equipment and central services such as IT; and
- the Research Councils fully fund the cost of specific research projects, allowing funding of researchers located outside a designated Centre of Excellence.

11. The CBI does not believe that the Research Assessment Exercise (RAE) linked to dual-support funding is serving the needs of the UK to best effect. The problems surrounding the current position on dual-support funding are:

- that it encourages all university departments to attempt to develop a research capability;
- that the RAE does not, in practice, give equal weighting to research of relevance to industry—this penalises departments who are trying to develop a portfolio of research from basic through to applied, compared to departments only pursuing basic research; and
- that it detracts from the importance of high quality and effective teaching.

12. The CBI firmly believes that the UK should move towards funding Centres of Excellence. These Centres would cover basic sciences and disciplines—such as biology, chemistry, physics and mathematics—inter-disciplinary research centres and networks of applied research expertise (ie the Faraday concept highlighted in the 1993 SET White Paper *Realising our Potential*[2]). These Centres of Excellence need not be single establishments, but could consist of consortia of university departments operating as virtual Centres (see paragraph 20).

13. To be effective, these Centres of Excellence would need to be funded on a five-year rolling basis, with an Advisory Board over-seeing the research strategy and providing quality control and assessment against the research objectives. These Centres would be required to develop research strategies and assess the level of equipment required. Centres of Excellence should be required to open up research facilities funded through this route to external researchers and grant holders.

14. The CBI fully supports the proposal in the NCIHE report that funding via the Research Councils should cover the full cost of the proposed project. As pointed out in the report this should *include the costs of premises infrastructural services and central computing*[3]. This must also provide for use of equipment and include depreciation costs so that HEIs can invest in new equipment as resolutions and technologies improve.

15. If universities are to ensure that they only support the research they can sustain they must be able to cost it realistically. Whilst this agrees with the overall message from the report, we do not support the use of 60-100 per cent of staff costs as an appropriate method of identifying the true cost, which risks falling into the old trap of applying percentages. Rather HEIs should be encouraged to put in place mechanisms to establish costs and use these to justify the price of the research to Research Councils, Government Departments or industry.

16. It may be that such a step would be too dramatic for the HEIs to deliver in the first year. In this case the use of overheads established relevant to staff costs could be used in the short term, with a clear goal of when this should be phased out and realistic costs used.

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[1] *Investing in research: ensuring excellence in the higher education sector* a Technology & Innovation Brief published in October 1997, CBI.

[2] *Realising our potential: A strategy for science, engineering and technology* May 1993, HMSO (now The Stationery Office), Cm 2250.

[3] Taken from the NCIHE report *Higher Education in the Learning Society* ISBN 1 85838 253 X or http://www.leeds.ac.uk/educol/ncihe.

17. The NCIHE report made three recommendations from where the additional Research Council funding should originate. Out of these, the CBI believes that these funds should be transferred from the Funding Bodies to the Research Councils. If the CBI proposals regarding transfer of research funding to the Research Councils and an increase in Government investment was adopted, then the question of additional funding would be fully addressed.

Alterations to the Research Assessment Exercise and the balance between teaching and research

18. The Dearing report recommended the retention of dual funding. If dual funding is retained, we urge that the Research Assessment Exercise is radically overhauled so that:

- only departments rated 4 or above receive block funding;
- equal weighting is given to research of industrial relevance; and
- greater effort is made to include industrialists and other users on the RAE Assessment Panels—in RAE 96, only 12 company representatives out of approximately 600 panellists where involved.

19. The CBI is particularly concerned that users of research must participate in the RAE Panels. These individuals should be selected on their experience within their own sphere of work and not be judged on level of academic kudos. The CBI was particularly disappointed that, despite members of our Inter-Company Academic Relations Group nominating individuals for the RAE 96 Panels, none were appointed.

20. The CBI recommends that a minimum of two research "users" should be appointed to each panel. The identity and origin of these will, of course vary according to subject and sector.

Funding for interdisciplinary and collaborative research projects and the sharing of research facilities

21. If the UK were to adopt the Centres of Excellence concept as the key mechanism to fund research in higher education this would facilitate the development of interdisciplinary and collaborative research. This would be achieved by encouraging a number of university departments and where appropriate companies, to work together to create virtual centres of excellence. One such example is the Virtual Centre of Excellence in Digital Broadcasting and Multimedia, announced by the DTI on 13 October 1997. This Centre of Excellence is on-line and to date eight universities and 11 companies are participating.

22. If funding is to move down the Centre of Excellence route, including support for basic disciplines, then a significant requirement to allow access to external researchers must be placed within their remit. Furthermore, this would actively encourage academics to work together as opposed to the RAE, which many have suggested, creates barriers to collaboration.

23. The Foresight Programme has a clear role in identifying areas requiring inter-disciplinary or collaborative research through Centres of Excellence. Foresight Panels should be able to monitor emerging changes and developments in research and technology and make recommendations to the Research Councils or relevant funding body to respond as appropriate.

The availability of and access to publicly-funded IT systems by researchers and others

24. There is an issue regarding provision of access to publicly-funded IT systems. SuperJANET provides the backbone of the university network in the UK and there is a rationale for opening access to industry, especially where collaborative research is on-going that would benefit from both partners having access to broadband networks. A joint industry-university working group could be established to identify the most appropriate mechanism to provide access to industry and how companies should contribute for any benefit.

Proposals for a research equipment loan scheme

25. Many CBI members have expressed concern over the deterioration of research infrastructure. Whilst it has, to date, been difficult to identify clearly any short-term impact, there was concern over the long-term health of our leading research laboratories. The CBI therefore has sympathy with the proposal for a rolling loan fund, which would, in the longer term, become self-sustaining.

26. However, the CBI remains unconvinced that industry would be willing to contribute directly to this new financing mechanism. The reasons for this are that companies:

- usually carry out collaborative research towards specific objectives with HEIs, whether they are short, medium or long term;
- often develop long-term relationships towards these objectives—if donations of equipment or sponsored posts are considered, these usually go to strategic partners;
- do not usually contribute to a loan fund over which they have little control over where the money ends up; and

— are unlikely to increase their sponsorship of universities by nearly one third on an annual basis[4], which will be required if the proposal that industry should contribute £50 million in each of two years is adopted.

27. This fund is unlikely to attract a significant amount of new money from industry but will, if anything, cause a re-allocation of funding.

28. The CBI firmly believes that Government should provide the infrastructure required to sustain the long-term strategic research base in this country. Participation by industry in collaborative research should be seen as a mechanism to leverage additional funds and encourage routes for UK companies to exploit the nation's intellectual capital, to enhance competitiveness and create jobs.

Proposals for an Industrial Partnership Development Fund (IPDF)

29. The recommendation to coordinate the various academic-industry initiatives designed to encourage development of new technologies and their transfer into industry is welcome. However we were surprised that greater recognition was not given in the main report to existing schemes and the Foresight programme especially. Certainly, significant changes have occurred since the publication of the 1993 White Paper on science, engineering and technology[5], with more companies seeking to collaborate with universities.

30. The Report of the Scottish National Committee provides a concise summary of Foresight and places it in context within Scotland. Paragraph 4.114 reads:

> *The Technology Foresight programme 'represents the most comprehensive inventory of national science and technology assets in three decades involving both academic and industrial constituencies'. It is designed to identify market opportunities and new technologies which would enhance wealth creation and quality of life. We strongly support this initiative (recently renamed Foresight) by the Department for Trade and Industry (DTI) and its aims, and note with approval that the Scottish Office Educationa nd Industry Department (SOEID), the Scottish Higher Education Funding Council (SHEFC) and the Royal Society of Edinburgh promote it through various continuing activities. We welcome SHEFC's proposals to encourage higher education institutions to give greater attention to Foresight through core activities and by examining ways in which higher education institutions are using Research Assessment Exercise (RAE) based grants in responding to Foresight. It must continue to be a key priority area for Scottish higher education research and development in the long term.*

31. Before implementing the recommendation for an IPDF, greater thought needs to be given to what added value it would give over the existing arrangements. Most notably the LINK Board provides a similar structure and the Government has recently been using its strong identity to brigade a number of initiatives under one banner.

32. Similarly the relationship with the Foresight Steering Group should be carefully considered. Indeed, consideration could be given to bringing together the Foresight Steering Group, the LINK Board and the proposed IPDF under one banner. This would bring together the key mechanism for identifying priorities and funding streams and could provide a clear role for a re-invigorated Foresight Steering Group.

CONCLUDING REMARKS

33. The CBI believes that action must be taken to ensure that the excellence in the science and engineering base is sustained for the future. This requires focussing on excellence and on relevance. By concentrating funding on the highest quality research and providing open access to the teaching and research expertise in our universities, the UK can ensure that this substantial investment is used to create wealth and improve the quality of life.

October 1997

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[4] In the *Science, engineering and technology statistics 1997* (OST, Cm 3695, July 1997) "business enterprise" provided £167 million to the higher education sector for research in 1995.

[5] *Realising our potential: A strategy for science, engineering and technology.* HMSO, Cm 2250, May 1993.

Examination of Witnesses

MR JOHN ROBINSON, Chairman, Smith & Nephew plc, DR DAVID SMITH, Chief Executive, Whatman plc and DR PHILIP WRIGHT, Senior Policy Adviser, Technology Group, Confederation of British Industry, were examined.

Chairman

245. May I welcome you, gentlemen? I think I saw you in the previous session so you have some idea of some of the questions we have been asking Sir Ron. I wonder, Mr Robinson—it is quite clear and we know that you are representing the CBI and we have invited you here wearing that hat, but you have individual roles in industry—I wonder if you would care to introduce yourself and then perhaps invite your colleagues to introduce themselves to us as well?

(*Mr Robinson*) Certainly. Thank you very much. John Robinson; I am Chairman of Smith & Nephew which is a science based business in healthcare products. We are about 40th in the United Kingdom in spenders on research and we spend about £40 million a year and about £2 million of that goes into university research contracts so Sir Ron was saying we are £2 million of the £180 million, so it is significant. I am also Chairman of two other companies, one in paper and packaging and one in mining and I am about to become Chairman of the Governing Council of Hull University so I know a little about what happens on the university side. I am also a chemical engineer.

246. Perhaps Dr Smith you could introduce yourself?

(*Dr Smith*) I am David Smith, I am the Chief Executive of Whatman plc which is 250 year old British company engaged in separation and purification with an increasing emphasis on science and technology and an increasing R&D spend. I am a former academic. I am a chemist by background. I am on the Council of EPSRC. I am also Chairman of the LINK Board.

247. Thank you very much indeed, Dr Smith. Dr Wright?

(*Dr Wright*) I am responsible at CBI for science engineering and technology policy, with a particular focus on academic/industry links. For instance I am the secretary to our Technology and Innovation Committee and I also operate an Inter-Company Academic Relations Group which consists of academic liaison managers and directors in our member companies.

248. Thank you very much. Mr Robinson, unless there is any specific question for your colleagues we will direct questions to you, if we may, and if you think they are best fielded outwards we will leave that for you to decide. Now in your submission to us, Mr Robinson, you argued that the dual-support funding system should be terminated and you made a case for proposing that all public funding for research should come from the Research Council thus ending that dual support funding. Is the problem really that there is not enough funds going into research rather than its method of allocation? Are you not chasing something that is irrelevant or do you believe that by eliminating dual funding you are going to get better value for money and therefore to some extent ameliorate the lack of funding?

(*Mr Robinson*) Well, both is the answer. If I could just step back a bit, we basically believe that we have a strong science and engineering base in this country but it is getting a bit ragged because the funding is too small and spread too thinly and we talk in our submission about an extra £400 million and remembering that the funding has slipped in real terms by £1 billion, public funding by £1 billion over the last ten years, that is just sort of redressing the balance a bit. It is a finger in the air, sort of estimating perhaps where it should be. But we believe that that is just part of the problem. The other part of the problem is that it is spread too thinly, there is a lack of focus and the money ought to go to university departments and groups, or even individuals, of real excellence and not get spread across people who happen to think they ought to start doing research. Part of the problem with dual funding we believe is that Vice-Chancellors get money through that funding route and put it where they wish and it may have been attracted by a five rated department in the RA Exercise and finish up going into a three rated department, if you understand what I mean. We really believe it is all about excellence and we really believe we have to get outside these shores. You see, sitting where we sit, when we make decisions about where to do research it is not what is the right university in this country or the right people in this country, it is where in the world and we must focus on being of true international stature. Dr Wright, you may want to amplify that?

(*Dr Wright*) Yes, when we considered how we should provide core funding for excellent research departments we actually stepped back again and looked at basic objectives of what we are trying to achieve, and that is to maintain that long term support, to concentrate it, but also to continue to provide a flexibility to the actual academics carrying out the research and most of all as well ensure that the real cost of research is recovered and there is clarity in the funding streams. I think that you and ourselves have heard from a number of sources the actual problems with, for instance, the Research Assessment Exercise, the concerns over the lack of account or recognition of research in collaboration with industry, the problems of the difficulty in looking at multidisciplinary research, but I think there is another issue actually. The RAE of course was developed before, for instance, the binary divide was removed. That was at a time when approximately there were only about half the universities around. So we then thought: "Well, what are we trying to achieve?" and actually what we are trying to do is to deliver and support the Centres of Excellence and that is not a single type of Centre of Excellence; it can be a range. So we are talking about basic science through departments, we are talking about Centres of Excellence to support multi-disciplinary research centres and indeed virtual centres. Indeed this morning I was at a launch from the EPSRC of their Faraday Centres so I think there is a variety of approaches that could be looked at.

[**Chairman** *Cont*]

249. Thank you very much indeed, but back to Mr Robinson just very briefly. You mentioned that you recommend a concentration on excellence. Perhaps you would agree with me that excellence is, to some extent, subjective and if all the funding were to go to the research councils is there not the danger that too much power would be in the hands of too few and that subjectivity might be exercised to the detriment overall of excellence?

(*Mr Robinson*) We believe that there has to be a panel approach which may be somewhat similar to the Research Assessment Exercise. There has to be a mechanism for assessing what excellence is, probably by panels of almost certainly our peer groups and academics, not necessarily all British, with the odd industrialists thrown in, making these judgments, not just some person sitting in and acting like God. So I think that process is very, very important.

Mr Beard

250. Do you not think though that if all the funds went through the research councils you would be reinforcing orthodoxy; that the unorthodox approach would tend to get ruled out; that we would not have the same curiosity driven research which is producing new ideas that then go on and get developed subsequently? It would be tending to elaborate the ideas that already exist because they are in the orthodox domain and discussion?

(*Mr Robinson*) Well, I will ask Dr Smith to answer this but I am not sure there is any evidence for that. I happen to believe that fundamental research is fundamentally important. You cannot carry on doing incremental work based on science base, so there would again have to be a mechanism in place to ensure an appropriate mix between blue skies research, incremental research and development, if you like.

251. That is what this mechanism is to an extent, is it not?

(*Mr Robinson*) Yes, but my concern is where all the money finishes up. I start from the premise—in a way, how it works is detail if you can understand what I am saying. The important thing is that the money actually finishes up in the internationally rated departments and with internationally rated researchers and does not get put into some place which, frankly, is a no-hoper and some of it finishes up there at the moment and therefore takes money away from what we want, you know, to help us doing what we do.

(*Dr Smith*) There is no evidence that the research councils are balancing off curiosity driven research against managed and focused programmes. It is true that the Foresight programmes themselves have been a major benefit in focusing the activities of the research councils which I absolutely applaud, but when you look at the detail of what is going on there is still an enormous amount of curiosity driven research and in fact all the recommendations from the various Foresight Panels have actually made the point very strongly that this should continue. So there is no evidence that the research councils in their judgment exercises of where they put research are penalising curiosity driven research; quite the opposite. The real challenge is how do you focus the activities and the point that Mr Robinson has made about the focus is a very real point for us in industry and actually in academe.

Dr Gibson

252. Let me make a quote from the Association of University Teachers. They say that:"....funding bodies research support provides the only way of funding unconventional or unfashionable fields or the unknown researcher if he does not have the reputation to compete for Research Council grants." Now how would you respond to that argument?

(*Dr Smith*) I do not see that there is any evidence that that is the case. It is true when you look at Research Council funding that most of it goes to highly rated research departments, but there is a substantial amount of funds that finds its way into unfashionable departments.

253. You do not think it goes to big names, people who have a track record? There is a retirement programme going on in universities as you know and many young people are coming through and finding it increasingly difficult to get grants because in competition for decreasing funds they do not have a track record or the requisite number of papers and so on. You know how the system works?

(*Dr Smith*) I do, yes.

254. So many younger people are demoralised and fed up; you have been an academic yourself?

(*Dr Smith*) But that is true whether you are in a poor department or even a great one.

255. To get over this, how would you encourage the young people to stay there and make the discoveries?

(*Dr Smith*) You have to find methods and encourage starter grants, encourage new researchers, the way I heard Canada being mentioned by Sir Ron Dearing. In Canada they do have starter grants for new academics, but the point is that you do have to encourage bright researchers, you do have to encourage active research wherever it is. The point is though the infrastructure necessary to do modern research is such that you really have to focus to get a bigger bang for your buck.

256. So what do you think the consequences would be to research in universities that did not get these five year rolling programme grants? What would happen to research? It would just fold, would it not?

(*Mr Robinson*) It depends what we mean by universities.

257. You tell me? I think I know?

(*Mr Robinson*) As Sir Ron was saying, there are places that are really teaching institutions and there are other places that are research based institutions which also teach to a very high standard hopefully. What we are saying is that that body which is research based has sort of filtered off into the other group to a fairly low standard and we are really saying we would rather it moved back in again and it may be that it needs to be even further focused than it used to be—I hate to use the ivy league term, but you know what I mean—so that we really do have more universities that are world class and more departments that are world class as against letting it

[**Dr Gibson** *Cont*]

footle out on the basis of the limited amount of money available. An infinite amount of money available and you have a different conclusion, but there is not; there is a limited amount of money available. So some departments and some institutions that have aspirations to do research on this mechanism would not have their aspirations fulfilled.

258. It is like a euphemism for them being second rate, really?

(*Mr Robinson*) No, they would not be second rate because the other side of the coin is teaching and there would be high class, hopefully, teaching organisations and Sir Ron's report has made recommendations as to how to enhance the level of teaching which I am very comfortable with.

259. Do you think the students would go to a university which just teaches?

(*Mr Robinson*) They have done it in the past. Before the redesignation of polytechnics when it was very clear what they were, there were institutions of that type—and they are still there—that were very high standard teaching institutions and people went in preference in some cases for it, but they have to be high standard. We must definitely get away from the concept that no research means second division. It can be first division and still do no research and that happens in the United States as Sir Ron was saying.

Chairman

260. I think Dr Wright wants to say something if I read you properly and then Dr Kumar and then Dr Williams?

(*Dr Wright*) Yes, it was just something in respect to actually identifying young researchers through the Research Council projects that are funded. It has been quite interesting actually from this morning's talk by the EPSRC that they are definitely increasing the level of responsive mode grant that they are putting out. If you actually look at their total grant put out 56 percent at the moment are actually through responsive mode and they are intending to increase that to 60 percent. Only 20 percent are through managed mode. So I think that they have moved in certain directions. They also have other schemes of trying to encourage young researchers to stay with a research career. For instance they have the case awards for starters, for young academics who are starting on the research career so that they can get a PhD student to work with them. So I think there are a lot of good activities going on.

Dr Kumar

261. Just a point to follow on, Mr Robinson, what Dr Gibson was saying about second class universities because the perception would be—perception, now I think that is very important for undergraduates and so forth and the public at large—that those who are not doing research were second class. How would you destroy that perception because if you can destroy that you have solved that and then you would be all right?

(*Mr Robinson*) I think actually in some respects what has been happening in the last few years has enhanced that perception so we now have league tables in various guises in the newspapers that actually create a continuum. Therefore, a high class teaching institution, because it scores zero in research starts half way up the table whatever it does. Therefore, what I am arguing is we have clearer definition, we are absolutely clear what we are doing and we do put emphasis, as the Dearing Report said, on quality of teaching and there is all the focus in there on training of teachers and qualifications for teaching and so on. So I think we need to be much clearer in our specification of what the institutions are and there are institutions that are very clearly top class, world class teaching institutions and it is a different measure, if you like, from those that are research based. They are indeed deemed to be different, but not second division.

Dr Williams

262. I think you have answered, or partially answered, the two topics I was going to raise, but I will put them nevertheless and then I have two or three other smaller points. The first is, in your submission to us you say that the dual-support funding system for research detracts from the importance of high-quality and effective teaching. What do those words mean? Do you mean there is a division between places that are very good at research and others that are very good at teaching?

(*Mr Robinson*) It is a slightly different angle on what Sir Ron was saying earlier. Dr Wright, would you like to answer this?

(*Dr Wright*) Yes, I think the problem is that we are talking about 115 universities. We cannot have 115 research departments. The polytechnic system actually delivered a very effective mechanism of training people, particularly for local SMEs and actually almost acting as a go-between with respect to advice on research and development in small local companies. We seem to have lost that. I think what we want to do is recognise and reward the teaching capability in its own right much more clearly. Many people have provided evidence that there is a link between good teaching and good research. Well perhaps that is not unsurprising because I think in every institution you generally get appointments on the basis of people's research performance. I hope that will change as the improvement in supporting lecturing staff actually occurs in the university system.

263. My second question—again I think it is partially answered -is that if all funding went to the Research Council you would still envisage something like a Research Assessment Exercise within the allocation of funds?

(*Dr Wright*) I think what we would envisage is advisory panels for each of the centres which would actually act and would be monitoring and advising the centre all of the time, so we would hope it would be a more continuous process, not just a five yearly cycle so it actually acts to look further into the future as well.

[Dr Williams *Cont*]

264. Is the main reason that you advocate this wholesale transfer to research councils that they are more mission driven and therefore the work then that would be paid for from public funds would be more in line with what you would like from university research—better links with industry?

(*Dr Wright*) I think there is an issue. There is a mission even for those universities which are carrying out more basic research. I think there is nothing wrong for a university department to support clearly basic science and basic research and I would hope that they would be accommodated in the system that we are recommending.

265. If there was that change, is there an additionality here? Does it mean that for every million that goes in that direction, there is money coming in from industry because one of my hobby horses, as it were, is that really the amount of money that comes in from industry in Britain can show investment research is relatively very small at below £200 million in an industrial research budget of about £7 billion.

(*Mr Robinson*) Again, the figures were mentioned earlier, but if you take the amount going into university research from industry relative to GNP we are actually greater than the United States of America and in the developed world only exceeded by Japan. The problem in university research funding if you compare us with other countries is not in the industrial investment, it is in public funding of research. That is where the low funding is.

266. But relatively, the figures I have got here are from the Dearing Report; the amount from industry is £157 million in a total university research budget of £2,559 million. That is about 6 percent of all research funding at universities is from industry. It just strikes me as a rather low global total?

(*Dr Wright*) The Government at the moment is very interested in benchmarking ourselves to other countries and certainly if you look at and do real comparisons, I have seen figures—and indeed Sir Robert May uses these figures himself—if you compare it on purchasing power parities it does emphasise that United Kingdom industry, comparable to the United States, invests slightly more, that is industry into United Kingdom universities. The only other one that exceeds it is Japan. I think the evidence is quite clear that actually United Kingdom companies do contribute quite substantially, compared to other countries, to our universities.

Chairman: Thank you very much. We must move on, I think, to Mr Turner.

Dr Turner

267. Thank you, Chairman. Dearing has identified a serious problem with obsolescent infrastructure and equipment and he proposed a revolving loan fund and your response to that was clearly somewhat lukewarm in that you say, if I may quote you: "This fund is unlikely to attract a significant amount of new money from industry, but will if anything cause a reallocation of funding." Now if the loan scheme were to be totally financed by Government rather than by depending to a degree at least on contributions from yourselves would you then support it?

(*Mr Robinson*) Well, can I step back a bit and say why we are lukewarm and that is probably a positive way of looking at our reaction. I say why should industry in fact want to do this, because industry is a lot of individual companies? What is in it for the company to support a revolving loan fund? Remember, by the way, that industrial funding to university research has accelerated significantly in the last few years so it is going up quickly. Remember also what I said earlier, that the large funders of research in the United Kingdom are British companies but global, so most of their business is outside the United Kingdom. The way to accelerate British funding of university research by industry is what I have been talking about, getting the standards up, which is about focusing. Then it will attract more money of the pot that is available, because, you know, the top 50 funders of research can fund anywhere in the world. You are making decisions between Harvard, Cambridge, York and Birmingham or something or other. It is that sort of judgment process. We invest in research programmes because on balance—and it is on balance—we think we are better off for doing it. In fact I happen to believe that the only way forward for manufacturing industry is to be science based and research based because that really is all we have to offer in the long run; therefore it is absolutely fundamental. In our company the product lines that are growing fastest are the ones with the biggest scientific content and the ones that are in decline are the commodity products which is hardly surprising. So it is fundamental. I cannot see why industry globally should support to this sort of fund. I think the way to get more money out of us into universities is to get the standards up which is about focus and how you will move money across.

268. Is there any mechanism that would lever you into it?

(*Dr Smith*) May I make a comment? As Chairman of the LINK Board I have seen a remarkable change over the last year in terms of industry's participation or willingness to participate in research funding and this willingness comes from partnership arrangements that are lubricated by Government funds, from the research councils, from other Ministries and so on, where there is obviously a good appetite from industry to participate in joint funding arrangements where they can see some value in the training activities which are directed towards things that are important to their industry. But the trouble I would have with a revolving fund, it is amorphous, it goes into a pot that they cannot control, they have no idea of what is actually being delivered by it. The way in which I would advocate you do it, and I heard Sir Ron Dearing say the same thing, that if this was funded by Government you would have a way to improve the infrastructure, but of course if it is a loan that means that universities have to pay it back. So if you continue with the situation at the moment where universities' infrastructure is being underfunded because of the underpayment of overheads there is no mechanism by which universities could pay that back and so you come into this terrible circle of lack

[Dr Turner *Cont*]
of funds again. More money is available from industry, provided that it can be targeted to things that they believe are of benefit to them as well as to the university and we have plenty of mechanisms to do that.

Dr Jones

269. So you felt that Sir Ron was over-optimistic in the way that he felt that it could work if the Government started to put extra money in itself?

(*Dr Smith*) I do not think that is a mechanism to attract funds.

Dr Turner

270. Do you think that his estimate of £400 to £500 million is a reasonable one?

(*Dr Smith*) I think it is a serious under-estimate.

271. What figure would you put on it?

(*Dr Smith*) Well, the numbers are there to see. If you compare where we should be if we had maintained the infrastructure, you are talking about billions of pounds. What we have to do is two things; first of all encourage focus so that we do not spread the money too thinly. We have to encourage making sure that we are world class. But the problem we have and the number I heard mentioned earlier, which is true, is we only do 5 percent of the world's research so we have to have a window onto the rest of the research in the world and you can only do that, that is find and apply, if you have people who know what they are looking at. Even that 5 percent has to be of world class to make sure that you can actually capture the rest.

Chairman

272. Dr Smith, in response to Mr Turner then you said that the amount of money needs to be a lot more than £500 million. Rather like other things in our society there is infinite demand, we know that, but would £500 million be sufficient to stop the rate of deterioration we have now and allow us to—maybe we would need £2 or £3 billion—put right all the deficiencies in the infrastructure, but if we had £500 million would that be an incremental progress towards getting it right?

(*Dr Smith*) Of course it would. I have no trouble with that.

273. Right. Thank you very much indeed?

(*Mr Robinson*) It is really interesting if you have the opportunity to go to some of our great research universities to see the superb work that is coming out of quite appalling laboratories and the problem is how that is sustainable. It is okay for the older guys who have sort of got used to it, but what worries me is attracting young academics into these awful conditions, and I am talking about some of our world class departments.

(*Dr Smith*) May I make an extra point about deficiencies? One of the problems you see in modern universities—and when I was a young academic I could see this coming; fortunately I was allowed to escape—but the real problem for young academics is that they are now asked to do too many things. Because of the lack of funds in universities they now do more than just teach, more than just do research and if anything is suffering—I heard this debate in the previous submissions about the balance about teaching and research and what was losing out—actually what is losing out is the researchers themselves, the academics themselves. They are being asked to do things that you would normally expect someone else to do; secretarial work, administrative work, even cleaning and normal administration activities. And the reason for that, of course, is that there is not sufficient funding at universities to cope with that. One of the things I would hope if we can get more new funds is that we increase the efficiency of our researchers and the efficiency of our teaching as well as improving the standards.

Mr Beard

274. The Joint Equipment Research Initiative in support of the Foresight exercise has been reasonably successful so far. How much more scope is there for that type of exercise, do you believe?

(*Dr Smith*) I think there is an insatiable demand at the moment for this. If you look at the response on the various initiatives on Foresight activities, particularly the original Foresight challenge, I can tell you with some feeling, it created so many applications that I had to spend the whole of last Christmas reading them and the same thing is happening with the current round. We have more than 3,000 applications at the moment coming in for a small pot of money which is only £10 million. So there is an enormous demand for partnership arrangements that are focused at things that industry need.

275. But is there the willingness of industry to keep on with that kind of thing?

(*Dr Smith*) I do not know what the limit is, but there seems to be.

276. There is a willingness on industry's part?

(*Dr Smith*) Yes. I mean these applications are with industry and industry has to pick up at least 50 percent of the funding so there does seem to be a rather large demand.

277. How much do you feel that this has done towards improving relationships between companies and industry?

(*Dr Smith*) The Foresight exercise itself has been absolutely brilliant in that. The dialogue that has now gone on between academic institutions, industry and Government has been remarkable over the last three years. There is a tremendous improvement.

278. Is that including across the CBI members generally?

(*Dr Smith*) Everywhere.

279. I think you said earlier that you felt that if you could get the long term right and the £400 to £500 million in there you could probably then close the gap with particular staff. Is that your position, that you actually think that what is wanted is a long—term way of providing for the infrastructure or do

[**Mr Beard** *Cont*]
you also accept that there is a need to make a jump now to put things right before you establish that long—term system?

(*Dr Smith*) There are two needs. First of all is the instant need to improve the situation which needs to be robust. The second thing that needs to happen is that we have to have mechanisms that maintain the infrastructure of the institutions which we wish to maintain and that means that you have to have a proper allocation of overheads. That requires, I think, and I heard the comment earlier that universities need to have better financial systems so that they understand where their money is and what they need. To have a blanket 60 percent or 70 percent does not actually solve the problem. You really need to have more accountability and responsibility, but in so doing you are able to therefore account for what you are doing and therefore have the mechanisms for making sure you get the funds. You have to have a mechanism for maintaining that infrastructure.

280. Have you a view on how much is required for this immediate jump?

(*Dr Smith*) The number that the Dearing Report suggests is a number that I cannot differ from. They have done more research than I have.

(*Dr Wright*) The Joint Research Equipment Initiative when it was first introduced, it was introduced of course after the cut at the time of 30 percent—I think it was in 1994-95 or 1995-96—of funding through the funding councils. It did cause some problems at that time for many of our companies, not least because the first they heard of the initiative was when academics were phoning them up to ask them to contribute to a proposal which they knew nothing about. I think the Dearing Report actually commented that there was a need to make sure that any introduction of new schemes followed full consultation with industry. I think the drawback of the Joint Research Eqipment Initiative, if there is one, is that it does not have this idea of a self-sustaining rolling fund. If we could somehow maybe get the two working together so that maybe if the Government put forward some core funding and then this could leverage in money from industry for specific projects and that that total money was then paid back into the rolling loan fund, then it could obviously generate I think a greater amount available to universities in the future. Obviously there would need to be this discussion I think you had with Sir Ron earlier about removing it from the PSBR, but I think that that could not probably be delivered in the current climate.

Dr Jones

281. I am supposed to ask questions about the Industrial Partnership Development Fund but I think that probably Sir Ron dealt with your concerns in his answer to my earlier question, so I would actually like to use the opportunity first of all to go back on a couple of things that I think want clarifying. Earlier on, Dr Smith, you were advocating that for new researchers there should be starter grants. How does that square with your concern that funding should be concentrated in areas of excellence? Is that not actually undermining your own argument? Second, also a few minutes ago you quoted Sir Ron saying that we only did 5 percent of the world's research yet that gave us a window on the remaining 95 percent. Is that not also true for staff in universities that are engaged in teaching, that they actually need to have some research experience themselves to actually have access to really get into the research that other people do and therefore to teach it?

(*Dr Smith*) Thank you very much for that. I fully endorse what you say. To be a teacher at the forefront of science and technology you need to do research or at least you need to have done it, you need to continue understanding what is going on and so the ideas of the scholarship funds that have been put forward in the Dearing Committee Report are something that I would endorse. Your point about young researchers getting starter grants is a very real one, but you can only reward excellence though, so what one would do in such mechanisms, and the one that is used in Canada is such, that young researchers have to make a research proposal which is judged by their peer groups, but they are judged in a slightly different way than the way in which you would judge the more experienced researchers and so they get a slightly easier ride, as it were. There is no sense that there is any dropping of standards.

282. Is that really practical; how can you judge that?

(*Dr Smith*) You can do that, but whether the researcher is in an isolated department or in a department of excellence, is not what is actually judged when you see the research proposal, whether it is in the research councils in the United Kingdom or the research activities in Canada and the United States.

Dr Jones: And if I could just ask the $400 million or should I say £400 million question—you are advocating that the Government spends an annual extra £400 million—where do you think this money should come from given that the CBI is constantly exhorting the Government to keep public expenditure under control?

Chairman

283. It is the first time we have not had a volunteer!

(*Dr Wright*) Before we considered that amount we had very serious discussions internally not least with our economics people and Kate Barker our chief economist. I think that the volume of concern that we have had from our members and I think the seriousness with which we view the situation has led us to make this recommendation. The question is where it would come from? Well I think we will have to leave that to the Government and maybe see what happens out of their comprehensive spending review, but I think we want to emphasise the point that we take it very seriously and we do think there is a problem that must be solved and I think the worrying thing is if nothing is acted upon and things are left to continue to slip.

(*Mr Robinson*) I think I would say that the danger is that what we have is not sustainable. Now if we say that money is not available and that may be the conclusion then I would say that is the Government's decision, but all that means is that we then have to become even more focused. The little we have we

[Chairman *Cont*]

really must get it focused because we are a small player in the great world of research and science and technology.

Dr Gibson

284. So it is: do we spend the money on an electro-microscope or a linear accelerator?

(*Mr Robinson*) I am not talking about capital, I am talking about funding Centres of Excellence and departments.

285. Let us change the subject then, is it biology we fund; is it physics; is it chemistry; is it whatever; or do you spread it further?

(*Mr Robinson*) No, you have to make judgements and it comes back to frankly supporting what we are strong at. Now what are we strong at in this country? Where is our industrial strength these days? It is in things like pharmaceuticals, biologically based science and so on and again these are very difficult decisions, but at the end of the day we are going to have to make choices like in many other aspects of what we do and decide where we are going to get the most for our money and it is tough, which means that some of the things are going to have to lose out which we love dearly.

Chairman

286. Thank you very much. Well, I may say thank you very much but it is a sad note to say thank you very much on?

(*Dr Smith*) May I add just one point to clarify the question which was just asked? There are actually two decisions you have to take if you are focusing.

287. Mr Robinson, I am not saying thank you very much we have finished, by the way? I meant thank you very much for that question. Back to you, Dr Smith?

(*Dr Smith*) If you have focusing there are two decisions you have to take in this debate. The first one is what subjects do you focus upon which is really a Government activity associated with foresight and all the other things that go into that? Then the second question is once you have decided what those subjects are, where do you do it? So there are actually two separate questions.

Dr Kumar

288. In your memorandum, in your report, Industrial Partnership Development Fund—one of the things that has been discussed by Sir Ron Dearing—would I be accurate in saying that you are ambivalent about that Fund and would you like to comment further on that if we do create this Fund would it undermine the success of the LINK scheme—I know Mr Smith is a Chairman of the Board of the LINK—and if so, why?

(*Dr Wright*) I think our concern was that first of all inventing another form or mechanism of funding we do not think would necessarily clarify the issue. The thing that has happened with the LINK scheme over the last few years is there has been greater use of its identity to deliver a variety of different schemes. For example, the Foresight Challenge Fund in the original round has now been put through LINK Foresight and I think there is more scope for delivering greater focus and flexibility in that way. There is also the issue, not just about a possible Industrial Partnership Development Fund, there is also the relationship for instance of funds that might come through the proposed Regional Development Agencies, and clearly some consideration has also to be given to that and the role of universities at the local and regional level in supporting those industries there. So I think that our concern is that before any moves are made careful consideration is given to how it relates to these other groups and what added value it will provide.

(*Dr Smith*) We already have a plethora of mechanisms to engage universities with industry. By creating yet another or imposing yet another makes it even more confusing. Most of the questions I get from my industrial friends are where do I go for different things because they see so many different programmes and so many different initiatives, and I hope that one of the things that we are trying to do in LINK and other mechanisms is to try and focus those down so that we have more clarity with our customer-base, if I can use that term of where they can go. So my personal view would be that I would not want to invest in yet another mechanism. We already have sufficient to do that.

Mr Beard

289. Sir Ron was actually suggesting that this was a means of simplifying the system so you did not have to invent other schemes?

(*Dr Smith*) We already have two well-known marks in this area, particularly the teaching company schemes and the LINK schemes and I do not see that putting another layer of bureaucracy in there, which would have to be the case in the first instance, would improve the situation.

Chairman

290. Mr Robinson, we have another couple or three questions if we may put them? I think they are fairly brief ones and I would like to ask about career structures for researchers. Many of us in this room, indeed many of us around this Committee table, have carried out research in the past and we know that our part two research was *ad hoc* and maybe our career structure was *ad hoc*. It could be debated that is a strength as much as a weakness, but I would like to ask you whether you think the *ad hoc* arrangements we have now to make a career in research are helping find the right kind of researchers that the United Kingdom industry wants from United Kingdom universities or is there a need to think of something more formal?

(*Dr Smith*) I am not certain I understand the question in relationship to industry?

291. To put it very simply then, is industry getting the type of researcher it wants from university or is there a need for a more formal career pattern for a researcher rather than the *ad hoc* one that we have?

(*Dr Smith*) I do not think there is a more formal need for a career development within the university. There is actually a more formal need for more formal

[**Chairman** *Cont*]

training in things other than the science base at which they do well. One of the things that comes through from many of the documents that we have seen in this is the need for better training in preparing undergraduates and post graduates for industry rather than just the science base and this has been waxed eloquently in the White Paper in 1993 and in other papers as well. That is going on now with different formal structures within universities. The career structure of academic researchers does not have a direct impact upon the needs of industry. What they do though is maintain a stable base, if you can so do it in universities, that enable a better focus on research activities.

292. Although you could argue, could you not, that having a more formal structure for university researchers who stay on at university would have a spin-off by producing better researchers that go out into industry.

(*Dr Smith*) Well certainly older ones.

293. Yes?

(*Dr Smith*) I think there is a need for some stability there. There is, as you know, a huge number of people who wander year to year around our university system without any long term goals.

(*Mr Robinson*) I think generally, as far as industry is concerned, the pool that we take from are new PhD graduates into research—now there is some transfer later on, but that is basically the pool—and I think the experience is that that pool at the moment is satisfactory. The concern is the future. If the whole thing gets diluted then it is less attractive for people to stay on and do a PhD, the brightest people, which are the ones we want to do that, and the whole thing just goes gently down hill. In some of our better departments in some of our better universities one is starting to see this happening to the extent that the majority at some places doing PhDs are actually overseas students who are not going to help the British industrial base; they are going to go back home. So I think there are signs there that the whole thing is on the downward track.

294. Can you make a quick response Dr Wright?

(*Dr Wright*) I wanted to put in actually from my own personal experience because I myself have carried out post-doctoral research both in the United States and the United Kingdom. I think there is an issue about trying to encourage at least some mobility and have our PhDs and post-doctorates have some experience of research overseas. I think that is invaluable in my own experience. The second issue is then about future progression. When I finished my second post-doctorate, and this is my personal experience, I made a decision to leave science at that time because I did not see a clear path of where I would be in five to ten years down the road. I hope that the recent Concordats between the various research councils and Government departments will improve the situation. I think it is too early to tell.

Dr Gibson

295. Another problem, as has been said, is that there is no money to help them do the research in the laboratories. Unless you have a research grant, you cannot take on PhD students. It used not to be a problem, but now you have to have £11,000 a year for a student to do a decent biological problem?

(*Mr Robinson*) Yes, you are absolutely right. That is part of the problem. All these things sort of interconnect, do they not?

Chairman: Our final question now from Mr Jones.

Mr Jones

296. I wanted to turn to IT systems. You argue in your submission to us that industry should benefit from publicly funded networks like SuperJANET. Could you explain what the benefits of that would be and would industry be prepared to pay for the use of these networks?

(*Dr Wright*) Maybe I should answer this. We did not do a great consultation in this areas. I asked a number of companies who I thought would be interested in this area about what they would like to see and how they would like to use it if they had access to things like SuperJANET. I think the response that came back was: "Yes, we would be willing to maybe contribute in some way or shape or form if we could see a benefit in its use." I have actually been well aware of some of the things that, for example, BT is doing with some academics. They are doing some very interesting work on actually testing the viability and robustness of new networks, some of the broad band networks. I think they have a project called LearnNet and certainly I can give you a contact for that if you wish further information on it. I think you would need to have a group of interested parties come together, both from the academic and the industrial side to really explore the issue further.

Chairman: Well, we have finished almost exactly on time. Mr Robinson, I am very grateful to you, the Committee is very grateful to you and to your colleagues, Dr Smith—and we are sorry we have got your nameplate wrong, Dr Smith; we have got David Smith right, we have not got the bit before it right—and to you Dr Wright as well for coming along from the CBI itself. You have come along at relatively short notice and we are very grateful for that. We were not sure how long Sir Ron could give us and we were not able to invite you earlier, but thank you for your co-operation, for your frank answers, for your submission and for your interest in this most important subject. We hope you will also find an interest in due course in the report that we shall write with your assistance this afternoon. Thank you.

Supplementary Memorandum submitted by the Confederation of British Industry

INTRODUCTION

1. Following the submission of a Memorandum and provision of oral evidence, the CBI's Technology & Innovation Committee wishes to clarify a number of points relating to the funding of research in institutes of Higher Education by companies. These additional points relate to the funding of research infrastructure and the level of support that can be expected from industry and should be seen in conjunction with the earlier memorandum submitted by the CBI. It represents the views of a broad range of companies who are represented on the Technology & Innovation Committee and also on the CBI's Inter-Company Academic Relations Group.

LEVEL OF UNIVERSITY RESEARCH FUNDING BY INDUSTRY

2. It is *unrealistic* to expect a significant increase in the level of funds provided by industry for research in universities. Companies already fund a significant level of R&D internally or through contract research organisations. The reason for carrying out research in the university sector is to extend the pool of knowledge to which the company has access. This is often longer-term research, which generally has an inherently greater risk of failure and is of less immediate benefit. Many companies also work with universities on a collaborative basis to aid with recruiting highly trained research and technical staff.

3. Between 1985 and 1993 there was a modest, but significant, year-on-year increase in the level of research funding received by the Higher Education sector from industry, both in cash and real terms (Exhibit 1). Between 1993 and 1994 the methodology for collecting this data changed with the removal of the binary divide between universities and polytechnics, which accounts for the small decrease observed at this time. However, with this exception the average annual increase in university research income from industry, since 1988, was £5.5 million. It must also be considered that these figures may not give the full picture, as it is uncertain to what extent they include, for example, sponsored posts, donations of equipment or funds or other in-kind contributions.

4. Although CBI companies have responded to joint funding initiatives, such as the Foresight Challenge fund and the Joint Research Equipment Initiative, they have stated that these do not attract new money, but rather cause a re-allocation of existing budgets. The evidence in Exhibit 1 supports this, although this does not undermine the principle objective of, for example, the Foresight Challenge, which is the coordination of resources from a variety of sources towards particular goals and objectives identified in the Foresight Programme. For companies, the prime focus for contributing to such schemes remains the support of strategic collaborations with particular university departments or individual academics.

5. Sir Robert May, the Government's Chief Scientific Adviser has also stated on a number of occasions that according to OECD figures, on a comparative basis, industry in the UK invests more in Higher Education than our leading competitor countries (including the USA and Germany) with the exception of Japan.

FUNDING RESEARCH EQUIPMENT AND INFRASTRUCTURE

6. CBI members have indicated that they see little attraction in contributing to the rolling loan fund in the form proposed in the report of the National Committee of Inquiry into Higher Education. The primary reason for this is that the majority of funding directed towards universities is to support strategic partnerships. While many companies are able to support some community or philanthropic projects, the scale and quantity of these are necessarily limited. Consequently, companies are unlikely to contribute to a fund over which they have little control.

7. Many of our members also wished to re-state their belief that it is the role of Government to support university research infrastructure through provision of public funds. However, this does not mean that an adapted rolling loan fund proposal could not be a success if the following comments are taken into account:

- Government should provide the money to establish the fund, although additional or matching money from industry could be attracted in for research proposals wherever appropriate—that is they are in line with a particular company's strategic collaboration with a university or academic.
- The loan fund should be taken out of the PSBR (as suggested for the student loan fund) so that a true self-sustaining pool of money is created that will grow.
- All loans (including the money drawn in from industry) would require repayment with a small level of interest. This would both encourage universities to include the use of large-scale equipment on direct costs of research projects and sustain the rolling loan fund.

8. If these points are taken into account, CBI members believe the establishment of the rolling loan fund is preferable to expanding other initiatives such as the Joint Research Equipment Initiative (JREI) established by the Funding and Research Councils. The principle reason for this is that the JREI is not self-sustaining and would be susceptible to fluctuations in public expenditure. The JREI is used for specific or targeted proposals, but this should also be the case for any rolling loan fund. Industrial participation in future rounds of the JREI and similar initiatives should not be taken for granted.

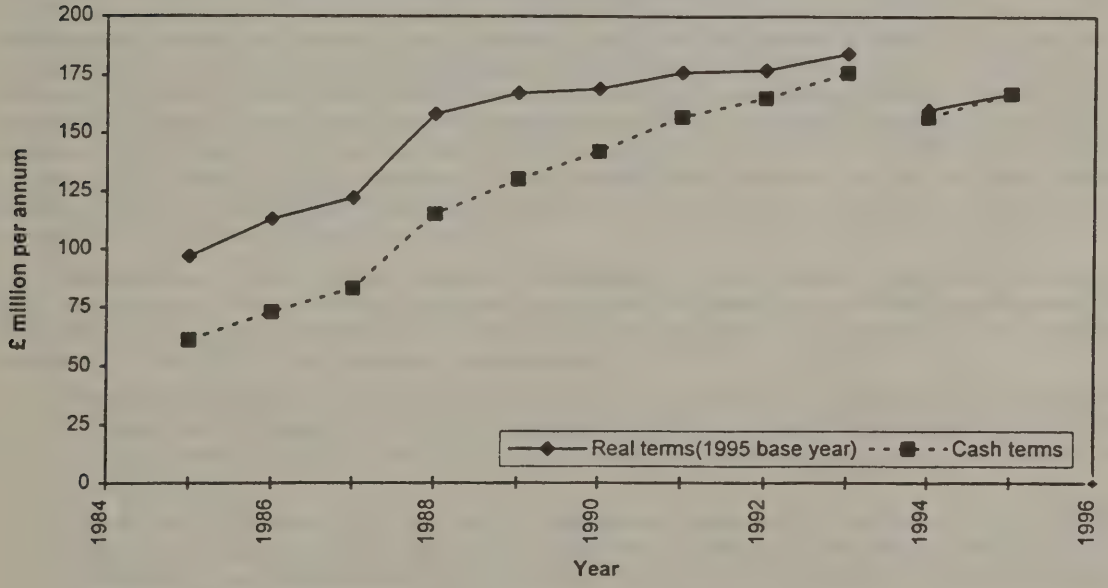
CONCLUDING REMARKS

9. Today all companies, both large and small, operate in a global market place. Over the last few years the CBI's Innovation Trends Survey has indicated an increasing willingness by all sizes of company to collaborate overseas, wherever it makes best commercial and technical sense. Many larger companies already collaborate with universities across the world and this is also increasingly the case for small and medium firms. If this trend is not to accelerate, then a satisfactory resolution to research infrastructure funding must be found.

January 1998

Exhibit 1

BUSINESS ENTERPRISE FUNDING OF RESEARCH IN INSTITUTES OF HIGHER EDUCATION



Year	*Real terms (1995 base year)*	*Cash terms*
1985	97	61
1986	113	73
1987	122	83
1988	158	115
1989	167	130
1990	169	142
1991	176	157
1992	177	165
1993	184	176
1994*	160	157
1995*	167	167

* Between 1993 and 1994, the method of data collection changed following the removal of the binary divide between universities and polytechnics. This is therefore likely to explain the decrease in the level of funding from industry. However, with this exception, since 1988, the average annual increase in university research income from Business enterprise has been £5.5 million.

WEDNESDAY 3 DECEMBER 1997

Members present:

Mr Nigel Beard	Mrs Caroline Spelman
Dr Lynn Jones	Dr Desmond Turner
Dr Ashok Kumar	

In the absence of the Chairman, Dr Jones was called to the Chair

Memorandum submitted by the Higher Education Funding Council for England

INTRODUCTION

1. Higher education institutions (HEIs) receive funding for research and research training from a variety of sources, including the Research Councils (RCs), Government Departments, the EC, charities, and industrial and commercial sponsors. Grant provided by the Funding Councils is usually the largest single source of funding, but—particularly in HEIs with a substantial portfolio of research activity—this generally accounts for a minority of income. In the higher education sector in Great Britain, research related grant from the Funding Councils formed 34 per cent of the research specific income received by the sector in 1995–96, the latest year for which full data are available (total funding council income = £779 million, total external income = £1,532 million). This proportion has been steadily falling, which reflects the fact that Funding Council grant exerts substantial leverage, but also that an increasing amount of research is being predicated upon a relatively declining infrastructure base.

2. Funds provided by the Funding Councils are fundamental to the support of research undertaken in HEIs. By supporting the provision of premises, equipment and permanent staff they contribute to the infrastructure costs which underpin the dual support arrangements. More specifically, the research component of the HEFCs' block grant has three purposes:

(a) It covers a majority of the costs of the basic research undertaken by universities, which forms the foundation for strategic and applied work, much of which is supported by other Government funds (from research councils and departments) and by charities, industrial and commercial organisations.

(b) Since the 1992 change in the dual support arrangements between RCs and universities, the HEFC block grant has contributed to the costs of permanent academic staff and premises required for RC projects. It also contributes to the infrastructure costs of other collaborative research undertakan by universities in conjunction with RCs.

(c) It contributes to the substantial fixed costs of training research students, in particular staff, premises, equipment, libraries and other essential facilities.

3. In allocating resources to institutions the Funding Councils apply a number of principles. These follow extensive consultation both within the HE sector and more widely. They are:

(a) Plurality. The Funding Councils' allocations build on the advantages which the availability of a range of funding sources brings, and seek to complement but not duplicate the aims of other funding agents.

(b) Selectivity. Funding Councils allocate funding selectively, according to the quality (determined through periodic Research Assessment Exercises) and, above a certain quality threshold, the volume of research carried out in each department in each institution.

(c) Balance. The Funding Councils seek to reinforce excellence, but also consider it important that funds should be available to encourage research potential and the development of new and interdisciplinary areas of work. Maintenance of a broad base of research and training in science and technology in the UK is essential.

(d) Competition. All HEIs are able to compete for the resources at the Funding Councils' disposals. Success, however, depends on the quality of the research undertaken and on its scale.

(e) Accountability. The Funding Councils require evidence from institutions that research activities are well managed and have clear strategic aims.

SUMMARY OF MAIN POINTS OF EVIDENCE

4. If an independent advisory council on national research policy were established, HEFCE would, of course, co-operate closely with it. However, it would be preferable to try and improve the performance of existing mechanisms.

5. The Research Assessment Exercise (RAE) is the instrument which informs the selective funding of research, and we have launched a consultation exercise which seeks views from HEIs on a range of issues related to it. However, we provide funds to institutions as a block grant and having established allocations, within agreed parameters, institutions themselves are in the best position to decide how to spend the money.

6. The recommendation to develop the IT infrastructure, particularly the network, is in keeping with the Joint Information Systems Committee's (JISC's) strategy. The network now accounts for the majority of JISC's expenditure and is being expanded to reach relevant communities, particularly internationally.

7. The proposal for a revolving loan fund, with funds provided equally by industry and the public sector, is welcome in principle. If matching funds are provided, we would be willing to use some of the funds which we have previously provided as grant for this purpose.

8. The recognition that there is an infrastructure gap is welcome. We are working with HEIs to provide more information about the indirect costs that they recover and to help them establish the full costs of the research they undertake.

9. We welcome the committee's endorsement of dual support funding. The HEFCE firmly believes that the long term interests of research in the UK are best served by the maintenance of the present arrangements for the public funding of research in universities. We also welcome endorsement of the principle that research funders should pay more towards the research infrastructure. However, we strongly oppose any further transfer of resources from the Funding Councils to the Research Councils which would do nothing to increase the resources available. If additional money is not provided, then the logic of the Committee's argument is that research activity needs to be reduced.

10. We accept the principle of encouraging appropriate collaboration and we are reviewing our funding and assessment mechanisms to ensure that it is encouraged; we have begun discussions with the other funding councils and the Research Councils to this end.

11. If an Industrial Partnership Development Fund (IPDF) is established we will of course play our part in making it succeed.

PROPOSALS FOR AN INDEPENDENT ADVISORY COUNCIL ON NATIONAL RESEARCH POLICY

12. If such a body were established, HEFCE would, of course, co-operate closely with it. However, it is not clear that additional mechanisms are needed in addition to the Council for Science and Technology and the Science and Engineering Base Co-ordinating Committee. It would be preferable to try and improve the performance of existing mechanisms rather than create a fresh one.

ALTERATIONS TO THE RESEARCH ASSESSMENT EXERCISE AND THE BALANCE BETWEEN TEACHING AND RESEARCH

13. We believe that the RAE's processes are generally sound and that the results are broadly accepted. We also believe that it has had a positive effect on research quality, output and accountability. However, as with all such systems, concerns have been raised about particular aspects. These currently include its cost and also that it may unduly influence academic behaviour both as regards the nature of research undertaken (for example that it may inhibit interdisciplinary research) and in deterring involvement in non-research activity.

14. We acknowledge that the Committee rightly has identified as an issue the fact that selective funding of research, and the RAE in particular, encourages some departments to undertake research and to make submissions to the RAE, when they would do better to focus their energies on other activities where they have greater strengths, and on teaching in particular. This is not only a problem in this country. There is a tendency for academics around the world to value and esteem research more highly than other activities. This tendency is perhaps reinforced by our highly selective funding of research, and is something we wish to counter. We agree with the Committee that it is important that academic staff are not drawn into research because there are insufficient rewards from teaching or other academic activity. The Committee's proposal, to provide an incentive to departments not to submit to the RAE, is one approach to resolve this issue.

15. We are considering the approach proposed by the Committee together with other approaches and will consult on the proposal in the context of our more general consultations on the RAE, which will in addition address questions of frequency, methods of assessment, facilitation of interdisciplinary research and interaction between panels. We will also consider whether incentives and rewards may be provided to encourage excellence in teaching and in other, academic-related, activities. Another approach might be to

enable otherwise unfunded institutions access to non-competitive research funding, perhaps building on the HEFCE's CollR Scheme which enables staff in poorly rated departments to conduct research in collaboration with others.

16. However, although the Funding Councils inform institutions of the basis for the formulaic allocation of the block grant to support teaching and research activity, allocations within the institution are not expected to mirror the formula precisely. In particular, institutions are free to decide their own allocations between subject areas. Hence the resources provided locally for research in HEIs will depend upon the priorities of the institution. However, since 1995 the HEFCE has asked for a report on the allocation of resources in respect of research by HEIs, in order to provide greater accountability for their expenditure.

The Availability of and Access to Publicly-funded IT Systems by Researchers and Others

17. The recommendation to develop the infrastructure, particularly the network, is in keeping with the Joint Information Systems Committee's (JISC's) strategy, which also focuses on initiatives to build electronic content and improve strategic management and staff capability in IT. The network accounts for the majority (61 per cent) of JISC's 1998/9 budgeted expenditure of £31·4m; the HEFCE contributes 81 per cent (£25·4m) of this sum. We have asked the JISC to continue to expand the reach of the network to relevant communities and this is reflected in a rise in network costs in future (increasing to 68 per cent in 1999/2000). However, our investment is only a small part of the overall support for IT within the HE sector.

18. We recognise the importance of improved access, particularly international access, and the JISC have been asked to provide costed options to supply protected international bandwidth for the research community as a matter of priority.

19. We have also asked the JISC to increase monitoring of what the network is used for, to ensure that it is funded and managed at a level appropriate to the needs of higher education researchers and their collaborators. Moderate volume related charging will be introduced to ensure effective use is made of expensive network resources. We will also investigate the costs and benefits of the computing hardware recommended by the Committee.

Proposals for a Research Equipment Loan Scheme

20. If the infrastructure gap (discussed below) is to be bridged, then additional funding will be required for equipment. The proposal for a revolving loan fund, to fund capital projects for refurbishment, equipment or to facilitate collaboration, with funds provided equally by industry and the public sector, is welcome in principle. If matching funds are provided, we would be willing to use some of the funds which we have previously provided as grant for this purpose. However, for the scheme proposed by the Committee to provide benefit, additional funds will have to be provided by industry.

21. The Funding Council's joint research equipment initiatives in 1996-97 and 1997-98, which have required matched funding by industry, have shown the potential benefit of such schemes, and if additional public resources were available, this would be an alternative approach to secure industrial contributions. Until such time as a revolving loan scheme is established, and subject to other financial contributions, we will continue with such programmes which contribute to the infrastructure and promote collaboration (with the unanimous support of the funding and research councils, a third round of JREI is about to be launched).

22. Such schemes could be co-ordinated with the Committee's proposal for an Industrial Partnership Development Fund, to provide a regional focus.

Funding for Research Infrastructure

23. An important purpose of HEFCE funding is to contribute to the research infrastructure on which specifically funded research can draw.

24. The identification of an infrastructure gap, and an indication of its extent, was a key conclusion of work undertaken by Segal, Quince and Wicksteed Ltd. on behalf of the CVCP and HEFCE. The Committee is right to say that funders of research will need to pay more towards the indirect costs of research, and towards the infrastructure for research.

25. In order to establish the basis for further discussions about this, extra information will be needed about the use made by universities and colleges of the indirect costs which they recover, and we are establishing this jointly with institutions. Moreover, in order to secure more realistic indirect costs, universities need to be able to be confident about the full costs of the research they are undertaking. Work is in hand to enable them to do so, and we are playing our part to ensure this is brought to a speedy conclusion.

26. The Committee also comments on the extent to which additional funding is required for the research infrastructure, to improve it sufficiently to enable the present level of research activity to continue. We believe that it is essential that any additional resources are used first for the improvement of our research capability

and only then should additional activity be considered. It is on this basis that the HEFCE has recently launched a laboratory refurbishment initiative, worth £30m per annum, beginning in April 1998. This funding will be allocated in response to research excellence, a clear coherent research strategy and a sound rationale for funding, particularly the facilitation of collaborative research.

27. We have in parallel commissioned further work from Segal, Quince Wicksteed Ltd which will examine how institutions have managed the infrastructure gap and will also undertake international benchmarking for research infrastructure resourcing.

The Future of the Dual-support Funding System and the Roles of the Research Councils and Higher Education Funding Councils

28. We welcome the endorsement of the dual-support funding system. The present dual support system is an extremely valuable feature of the funding of research and the HEFCE views the maintenance of this system as essential. The plurality of funding sources available to universities allows a range of judgements to influence the direction of research. In particular:

(a) Because the HEFCE has responsibility for funding both teaching and research, and maintains direct and well established relationships with all institutions in the sector, it is able to steer the HE system along broad lines. It encourages universities to develop in ways which reflect their strengths in, and potential contribution to, both teaching and research, and it is able to take an overall view of each institution.

(b) Institutions have a number of sources of funding and a range of clients. This applies both to teaching and research, but especially research. Against this background, the HEFCE has in place comprehensive monitoring arrangements, and it is the only body able to assess institutions financial health and academic performance across the full range of their activities, and to initiate corrective action when appropriate.

(c) The HEFCE's research funding is not tied to particular projects or narrow objectives. It provides the core funding which enables universities to pursue their own strategies for teaching and research. Part of this is enabling work to be taken to the point where it is sufficiently defined that it can take advantage of funding opportunities offered by other agencies whose aims are more focused and circumscribed. In addition, by supporting the overall research effort of an institution, (including research outside the fields of science and technology) it enables institutions to foster interdisciplinary research without necessarily having to deal with several funding agencies whose aims may conflict.

(d) For the stronger research institutions in particular, the HEFCE's funding provides the longer term stability which is so important for the maintenance of research strength.

(e) Because of it overall responsibilities the HEFCE is able to exercise a broad strategic influence on research and postgraduate student numbers in HE, as well as take account of the close interdependence between postgraduate teaching and research. Whilst it recognises the importance of allowing universities discretion to direct their own research, the HEFCE is nevertheless able to exercise a broad steer.

(f) The HEFCE has demonstrated its ability to allocate research funding selectively, and a substantial shift of resources towards institutions with strong research performance has already been achieved.

29. We strongly support the Committee's proposal that funders of research should pay more towards the infrastructure through a higher charge for indirect costs. The Committee estimates the cost of this to the Research Councils will be £110 million per annum. The Report argues that Research Councils should be enabled to maintain their present volume of research activity by being provided with increased resources of £110 million. We agree with this. However, if additional funds are not provided, we strongly oppose any further transfer of resources from the Funding Councils to the Research Councils. Such a transfer would not increase the amount of public funding: if the Research Councils were to have more then the Funding Councils would be able to provide less. In the event of additional money not being provided, then the logic of the Committee's argument is that there will need to be a reduction in research activity if the infrastructure is not to be eroded further. However, given the extent to which research council funds are committed in advance, the difficulty of achieving a reduction in research volume should not be underestimated; there will be serious consequences for the quality of research if additional funds are not provided.

FUNDING FOR INTERDISCIPLINARY RESEARCH AND COLLABORATIVE RESEARCH PROJECTS AND THE SHARING OF RESEARCH FACILITIES

30. We agree with the Dearing Committee that assessment and funding regimes should be amenable to interdisciplinary (often better described as multidisciplinary) research, and acknowledge that the assessment of interdisciplinary research was one of the aspects of the last RAE which caused some concern. However, the growth in multidisciplinary research is such that it is doubtful if the RAE is a deterrent. Nevertheless, we are discussing jointly commissioning a project on the funding and assessment of interdisciplinary research with other Funding Councils and the Research Councils. This study will bring together practitioners and users of interdisciplinary research to work closely with the commissioned agency.

31. We recognise that there is increased scope for collaboration although, as the Report makes clear, there is already substantial collaborative research effort. All special research initiatives strongly promote collaboration, including the research equipment initiative and the new laboratory refurbishment initiative. In addition, in May 1997 we launched the CollR initiative that enables staff in 2 and 3B rated departments in former PCFC institutions to undertake collaborative research. We will consider whether further such initiatives are required to encourage collaborative research, particularly at regional centres.

PROPOSALS FOR THE INDUSTRIAL PARTNERSHIP DEVELOPMENT FUND

32. If an IPDF is established we will of course play our part in making it succeed.

20 October 1997

Annex

1997–98 HEFCE QR FUNDING (£)

(including the Research related component of former formula capital funding)

Date prepared 19 November 1997; Source: HEFCE ASG

ASC Groupings	*1997–98 Quanta (moderated)*
1 Clinical Medicine, Dentistry and Vet. Science	102,990,459
2 Subjects and Professions allied to Medicine	32,678,429
3 Science and Pre-clinical Subjects	163,581,524
4 Engineering and Technology	95,081,314
5 Built Environment	9,388,224
6 Mathematical Sciences, IT and Computing	53,209,202
7 Business and Management	19,932,694
8 Social Sciences	74,772,002
9 Humanities	85,562,655
10 Art, Design and Performing Arts	19,380,471
11 Education	27,423,024
Total	683,999,998
"Science" proportion (calculated as ASC groups 1–4	58%
"Science" proportion (calculated as ASC groups 1–8	81%

Memorandum submitted by the Higher Education Funding Council for Wales

INTRODUCTION

1. The Higher Education Funding Council for Wales (HEFCW) was established by the Further and Higher Education Act 1992. The Council is responsible for the administration of funds made available by the Secretary of State for Wales and others in support, inter alia, of the provision of education and the undertaking of research by higher education institutions (HEIs) in Wales.

SUMMARY OF EVIDENCE

2. The Dearing Report recognises that the higher education sector is facing a significant research funding gap which poses a serious threat to the UK's research capability and standing. The Council strongly believes that this threat can only properly be averted by the provision of new and additional funds for research. Redistributing existing funds between the bodies responsible for their administration will not constitute a solution. In particular, the Council is concerned that there should be no further transfer of funds from the Funding Councils to the Research Councils. From the Council's point of view, any such transfer would impact directly and adversely on the research base in Wales and its ability to make a strong regional contribution.

3. The specific points on which the Committee has invited views are addressed below. For convenience, they have been re-ordered, and some related issues have been grouped together.

EVIDENCE

Dual Support System

4. Under the dual support system, the Funding Councils are responsible for providing institutions with the basic infrastructure required to undertake research, while the Research Councils fund specific projects, selected on the basis of competitive peer review. The Council is strongly committed to maintaining this system, under which each provider has a clearly defined and complementary role.

5. The provision of research funding by the Funding Councils offers important benefits to institutions, including:

- securing the foundations of the research base on which others, including not only the Research Councils but also charities, industry and overseas foundations, may build their programmes and projects;
- the opportunity to pursue speculative research in new areas which are not sufficiently developed to attract other funding;
- continuity of funding to maintain research teams in the intervals between awards from external sources; and
- resources to support new and young scholars while they are establishing their research credentials in the eyes, in particular, of the Research Councils.

6. The Council holds strongly to the view that there should be no further shifts in funding between the two sides of the dual support system. Thus, while it does not oppose the Dearing recommendation that Research Council awards should meet indirect costs in full, it considers it essential that the additional resources required should be provided through an increase in government funding and not through a transfer of resources from the Funding Councils. Transfer would not address the core of the problem—lack of sufficient investment. Moreover, the Council firmly believes that any transfer of funding from HEFCW to the Research Councils would impact directly and adversely on the research base in Wales. From this point of view, the Council would expect Welsh Office ministers and Welsh institutions to oppose any proposed transfer of funds in the strongest possible terms.

Investment Issues

Research Infrastructure—General

7. The Dearing Report recognises that the research funding gap has arisen because increases in the volume of research have not been matched by commensurate increases in funding. The Report acknowledges and is clear on the point that the competitiveness of the UK research base cannot be maintained without a major injection of funds. The Council wishes to emphasise its belief that the problem can only be resolved through the provision of extra funds.

Research Equipment Loan Scheme

8. The Council fully recognises the need for additional funding for research equipment. The sources of funding for equipment purchase are currently very limited: that element of the Council's grant attributable to capital has been reduced by two thirds in three years and the Private Finance Initiative, posed as a possible alternative source of funding, rarely proves suitable for equipment purchase. In this context the Council would welcome the establishment of a revolving loan fund for equipment provided that the resources required were entirely additional to existing Council funding and that there were appropriate earmarking of funds for Wales. Given the inevitably long repayment period involved, the Council does not consider that it would be cost-effective to topslice its recurrent grant, which includes its already heavily reduced capital funding, to support such a loan scheme.

Industrial Partnership Development Fund

9. The Council is sceptical about the attraction to industry of the proposed Industrial Partnership Development Fund. If the Fund were to be established, however, the Council sees that it could provide a useful umbrella for the present rather disparate range of national initiatives to support applied research. The Council would support the administration of the Fund on a regional basis but believes that it might appropriately take on that function itself given its responsibility for higher education in Wales.

Funding of Interdisciplinary and Collaborative Research Projects and the Sharing of Research Facilities

10. The Council recognises the value of encouraging interdisciplinary research, which is often particularly innovative and creative, and the sharing of research facilities, which makes for efficient use of scarce resources. The Report acknowledges that although it is sometimes claimed that current research assessment practices and funding methodologies may discourage interdisciplinary and collaborative research, no conclusive evidence has been produced to this effect. These are, however, areas which the Council will continue to keep under review jointly with its sister Funding Councils and also independently. For its own part, the Council has for some time been actively pursuing a policy of encouraging collaboration through the earmarking of funds to support integrative developments.

Availability and Access to IT

11. The Council recognises that, in the Joint Academic Network (JANET), the UK possesses an enviable IT resource. It is committed to maintaining its support for the network and for the further development of network services. At the same time, however, the Council fully supports the early introduction of charges for the use of the network and network services. It sees charges as a means both of encouraging disciplined and responsible use and of raising revenue for reinvestment to ensure the network remains at the leading edge and services develop in pace with, if not ahead of, need.

Research Assessment Exercise

12. The Council agrees that it is desirable to encourage institutions to make strategic decisions about entering the RAE but it has reservations about the mechanism proposed. There have been frequent government statements to the effect that funding for scholarship is included in that supplied for teaching. Moreover, the Council considers that lecturers should regard engagement with scholarship as a routine professional requirement so that there should be no need for the inducement of a separate element of grant. In the Council's view, the core issue is the continued erosion of the unit of funding for teaching which makes engagement in scholarship ever more difficult.

Independent Advisory Council on National Research Policy

13. The Council has considerable reservations about the recommendation that the Government should establish a high level independent body to advise on national policies for research. A number of over-arching organisations are already in existence—the Committee for Science and Technology and the Science and Engineering Base Co-ordinating Committee, for example—and the Report acknowledges that the NCIHE did not have sufficient time to understand fully the working of these bodies. The Council considers that, rather than introducing a further organisational tier, the existing mechanisms should be reviewed and, if necessary, improved.

17 October 1997

Examination of Witnesses

PROFESSOR BRIAN FENDER, Chief Executive, MR BAHRAM BEKHRADNIA, Director of Policy, DR DAVID PILSBURY, Head of Research Policy, Higher Education Funding Council for England, PROFESSOR JOHN ANDREWS, Chief Executive, and PROFESSOR ROGER WILLIAMS, Member, Higher Education Funding Council for Wales, were examined.

Dr Jones

297. Welcome to the Science and Technology Select Committee. First of all, our apologies for being late in starting and keeping you waiting. Secondly, because we are so depleted in numbers. One of our numbers has just had a baby and I suspect the other of having health problems, so apologies for that, but I hope we will manage to have an interesting session. To save time I propose to go straight into our questions, but if there are any points which are not picked up during the questioning and you would like to make a comment at the end, hopefully there might be an opportunity to do so. If I could kick off by asking you the first question: we have been told by Save British Science that it is now impossible to do research in universities without research council funding. Do you agree?

(*Professor Fender*) I think the simple answer to that is no, but it is also very important that one does not pick out one strand of funding because there is no doubt that research is funded through multiple sources. Universities at the institutional level and the departmental level, and at the level of individuals, recognise the real world of multiple funding.

(*Professor Andrews*) Certainly, in the arts, you clearly do your research on the basis of such funding as you can get from the funding councils or the British Academy. I would have thought that there was a significant amount of research done in universities which is not supported by the research councils. It is fair to say that the greater bulk of the heavier end, particularly of science and engineering research, is very dependent on research council funding.

298. So do you feel that the dual research system is still robust or is it creaking? We have been told it has collapsed, but creaking might be more appropriate. If you agree with that, what do you think has led to this state of affairs, and who is responsible for it?

(*Professor Fender*) I would not use creaking. I would use under-funded. The dual support system is a very good system and has delivered Britain, at this point, to a higher level of sophistication and success in its research programmes. The question is: what about the future? Is there enough money to make sure that we can continue with what is a very prominent position in world research? We are talking about science and technology. I have confined my remarks roughly to science and technology because I think that is appropriate. A helpful way of looking at it is to look at the very buoyant increase in project-funded research, remembering that the infrastructure and support provided by the Funding councils, to a large extent, does allow and provide a platform for that project funding—not least, of course, through the funding of academic staff. Now, if you just look at recent years, you will see that the project funding from all sources has increased by 8 per cent per year. In years before that it was even higher. So you have a position now where if I take England as an example, there is 1.3 billion of project funding supported by around 700 million of Funding Council money.

299. Does anyone else want to make any comment on the current state of dual funding?

(*Professor Williams*) I defend the dual support system, I would describe it as a presently a thing of genius. However, it is not the only way of funding research. Other countries do it differently. But this is our way, it works splendidly, and there is abundant evidence showing that. The great problem, as Professor Fender has said, is that it has become increasingly under-funded. It is a mistake to confuse lack of funds with the failure of, or inequalities in, the system.

Mr Beard

300. Is it the policy of the Funding Council to reduce the number of university departments doing research? If that is the line of development, how many universities do you think should be funded to do research?

(*Professor Fender*) Let us be absolutely clear. What the Funding Council funds are, technically, units of assessment, which may sometimes be thought of as departments. We do that very deliberately because we want to direct the money through to an identifiable group of individuals working in a similar activity of research. So the institutional funding is no more than the sum of the individual units of assessment or departments and how well they have done in research assessment. We try not to have a view about institutional funding for the very good reason that we want to support excellence in research wherever it occurs. The evidence is that research excellence does occur rather widely and in those circumstances we want to be able to support it wherever it is.

301. So you would not see the future as being one of focusing on resources?

(*Professor Fender*) We fund selectively with a competitive system. That does lead to concentration. For many research activities you do want concentration. You want concentration because of the way in which academic staff members interact with each other. You want a lively environment for graduate students. That requires a certain concentration. I do not think you should be prescriptive about that. It is really for universities to determine what are the optimum sizes for their research activity.

302. Are you generally, on the Funding Council, content with the general level and quality of research that is going on in universities?

(*Professor Fender*) If you look at my views, if you like, or the views of the Council, in a subjective sense they are of as much value as the external indicators that we have. Those in the science and technology

[**Mr Beard** *Cont*]

area are fairly reliably indicated by the citations and the number of publications in science and technology subjects. We know the UK figures. 1 per cent of the population, 5 per cent of wealth and 9 per cent of the citations. I am sure they are engraved on your hearts as they are on ours. We have a very good record. Subjectively, in a sense, but also quantitatively, we can see that research has improved. We take a great deal of trouble to make sure that within a subject the judgments of one research assessment exercise relate to another. We make sure, for example, that there is a good deal of consistency in the Chairman of the panels from one RAE to the next to try to keep a high measure of continuity and in order that we may guard against making prescriptive judgments. The figures demonstrate very clearly that from 1992 to 1996 there was a significant improvement right across all subjects and all types of institutional departments.

303. Do you see any scope for improvement under the present circumstances, the present levels of funding, other ways in which this could be still further improved?

(*Professor Fender*) You always aim for improvement.

304. Are there any particular, identifiable means to that?

(*Professor Fender*) We are beginning to come back to the earlier question that delivering continuous improvement will be impossible without a proper level of funding. That is clear.

Dr Jones

305. Are we worrying about delivering continued improvement, or that things could start moving in the other direction? Is that a problem?

(*Professor Fender*) Decline is always slow, is it not? It creeps up on you. We do not want that to happen. There must be a risk of that because, if I refer to the bibliometric evidence, we have to take into account the time-lag in getting through to measuring and observing the citations of British published work. There is a time for the impact of work to register. There is the time taken for publication, and of course, there is the time taken to do research. Inevitably, if you use those external measures, there is a time-lag of five, six, seven years. Yes, one is concerned that a period of decline—

306. Which is really attributable to what happened seven years previously.

(*Professor Fender*) We know that the research assessment exercise is, in a sense, a little shorter than that. Nevertheless, it is a retrospective exercise. It is looking at past outputs and past performance, as well as taking into account the plans for the future. Decline can set in if there is inadequate funding, I believe, and it will happen in a number of insidious ways. For example, perhaps because people do not have the equipment they want, they are a little less ambitious in planning their research programme. Their horizons may be narrowed if the range of resources available to them is limited.

(*Mr Bekhradnia*) Just to put a gloss on that. We had a review of research equipment carried out for us by a research consultancy a year or so ago and that was precisely one of the conclusions of that. That lack of research equipment and research facilities was beginning to risk affecting the decisions of researchers about the research they could conduct.

(*Professor Andrews*) May I come in and say that it is possible, I believe, to drive improvement in research. Within Wales it is no secret that research in the university system in the 1980s was not good, it was deteriorating. When we came into the new Funding Council in 1992, one of the injunctions we had from the Secretary of State in the first letter of guidance was to improve the quality of research. We were given a small amount of money, £2 million, to improve the quality. We did this by inviting bids from institutions and carefully targeting the funding on departments, in which we believed we had a chance of scoring a 5 or a 4 in the 1996 Research Assessment Exercise. We put a lot of time, a lot of thought into this. In that exercise we increased threefold the number of units of assessment in Wales getting grade 5, the highest grading, and almost doubled the numbers getting a 4. This was from a less strong base than England. Our approach has been different. Not only have we wanted to see a strengthening of the quality of research in Wales, but we have also looked to increase the number of high quality departments. Part of this has been associated with economic prosperity in Wales—we have taken the view that we should work with other public agencies on this. A high-quality research basis is vital if we are going to attract inward investment.

(*Professor Williams*) As an English Vice Chancellor at Reading, sitting on a Welsh Funding Council, I would like to underline that point. I was full of admiration for what it was possible for the Funding Council to do in targeting that way, although it was creating more competition for me, as it were. May I also underline the point Professor Fender made earlier. The Committee, I am sure, will have seen Sir Robert May's paper on science earlier this year, which demonstrates the strength of British science. It is an important paper but it is, in a sense, a reflection of the investment which went into British science in the past, not the investment which has gone in the last two years.

Dr Jones: That brings us on to question 4. Mr Beard.

Mr Beard

307. The Dearing Report suggested that there would be a case for concentrating funding on departments that scored 3a or higher. Do you think that goes far enough?

(*Professor Fender*) It is quite a delicate balance; this question of the right degree of selectivity. First of all, you certainly need to make sure that you have enough money to support the world class departments or groups. I use department as a convenient form. But you have also to take account of and provide mechanisms for departments to improve. You also have to have a system which is flexible enough to allow new research areas to come into play. If we sat here 30 or 40 years on, we would probably have a different view about which areas of research were important than we do now. Of course, areas of research which are relatively immature, are

[**Mr Beard** *Cont*]
not going to score as heavily as those which have been successful for decades. So our mechanisms for measuring and rewarding research require us not only to reward excellence, but have a ladder so that there is an opportunity to improve, and there is a possibility for new areas of research to climb up the resources ladder.

(*Professor Andrews*) May I give an illustration of that. It would be the area of art and design where there is no great research tradition. It is only beginning to build up now. We have two departments in South Wales, one grade 3a and the other 3b. Graphics, the whole media industry in South Wales is one of the major growth industries. It is important that it is underpinned by that sort of research. If we cut off those departments which are coming up, we run the risk that we will never develop high grade research in this area. We are not simply talking about the arts. We are also talking about electronics and arts, a wide range of research.

Dr Jones

308. So how do we square the circle? On the one hand, there is a feeling that we have got to concentrate on ensuring excellence; on the other, making sure there is an opportunity for new areas of endeavour. I understand that the English Council has proposed a Collaborative Research Initiative. Is it worth raising this at this point?

(*Professor Fender*) That is one of the mechanisms we use for departments which have not scored very well in the research exercise, but which have a number of potentially good researchers. We encourage them to collaborate with stronger research groups in order to make use of their talents and at the same time to build up, if you like, the research concentration through collaboration rather than putting it all on one base, so that is certainly one of the mechanisms.

309. How much of the money is going into that area and what are the other mechanisms?

(*Professor Fender*) That is a tiny sum of money, 16 million out of 700 million. The general question, which is bound to arise after the next research exercise, is about how steep should be the reward curve, remembering that the strongest departments get four times as much as departments which themselves have a majority of work at the level of national excellence. A factor of four is a very steep curve. The judgment about what is the appropriate curve to balance the need to support the best departments and still to have it dynamic in terms of improving departments and subjects, that will have to be made clear nearer the time of the next RAE, I think.

Dr Kumar

310. In your submission, both of the Councils have strongly opposed the further dual-support transfer from the Funding Council to the research councils. Can you tell us why. Will there be a long-term effect of this further transfer?

(*Professor Andrews*) Basically, the support which institutions get from ourselves maintains the research base. It allows for the new research, which is not at a level yet where it can bring in funding from research councils. It supports the young scholars. It supports the on-going research in departments between times when they might have project funding coming in. It is also vital, from our point of view in Wales, in that it supports the research base in Wales. Wales gets a relatively small proportion of research council funding. It gets 2.9 per cent. Our share of the United Kingdom economy is 5 per cent. It is regarded as vital by ourselves and by successive Secretaries of State that we have this research propensity for Wales, for reasons I have said before, because of support for industry. It is regarded as vital by universities because it is only on that funding that they can offer permanent contracts to staff and build up their infrastructure. If you did away with that, or shifted to more project based research, you would destabilise the infrastructure, the basic university system.

(*Professor Fender*) Put bluntly, research in Britain deserves more money. Moving it from one body to another does not generate any extra money.

311. Can I follow that on. Would you be in favour of a transfer from a highly rated research department, a research assessment exercise, for universities transferring money from the high-rated department to a low-rated department?

(*Professor Andrews*) Unless they did it strategically, any university doing that would be silly because it would be putting money earned by high-grade research at risk, by taking it away from the present department and giving it to a department which had not been selected for the quality of its research. If the institution did it strategically, because it wanted to develop a new dimension to its research or it knew that it had young and able researchers there, that would be a different thing. I think, almost without exception, universities learned the lesson in the 1980s that if you spread your research funding thinly, you end up with poor results. That you, yourselves, as institutions should back excellence, but that would include potential excellence and you may want to top-slice to develop potential excellence.

Dr Jones

312. I think it was the CBI who made this suggestion that the universities were not putting the money where it was intended. You do not think there is evidence about that?

(*Professor Andrews*) We check with our institutions. They will top slice for specific purposes, but basically the way they distribute funding reflects the way in which we give it and the way in which it has been earned.

(*Professor Fender*) The improvement of research is fairly striking whether you look at it from the top or from the middle, and comes about largely because universities are being more strategic; managing their research better; and really there is little sign that they are not doing the job. Otherwise, you would not get the improvement we have seen, as we are now on a relatively flat funding base.

Mr Beard

313. When you say that overall we have not enough money, not what pocket you put it into, when do we know that enough is enough? What are the criteria for how much?

(*Professor Fender*) It is true that you would always expect researchers to have ambitions greater than the length of their pocket. It would be a bad sign if they were not hungry in that way. Mr Bekhradnia has referred to the evidence in terms of equipment. We will soon have, I am sure, quantitative evidence of how much there is a need to upgrade the laboratory building side when we get the bids for our Initiative, which we will start later on this month, in fact. This is because then we will have specific proposals for additional funding, to meet the problems of laboratories which are not up to a proper standard.

(*Professor Williams*) May I add something on that. Ten years ago, when I used to act as an adviser to the Lords Science and Technology Committee, I remember arguing that one of the indicators that the United Kingdom could usefully use is a basket of performances by our competitors. It was the case then, and is the case now, that if you compare us in terms of percentage of research and development—of GDP, that is—we have not looked very good in the full figures. But that is a fair measure to start with. I would not suggest it is a perfect indicator. There are others you can use in detail because in some areas you would not want to do research because France is doing it or Germany is doing it. But as an indicator it is a fair one. We have not kept pace in the last 20 years on that indicator.

(*Professor Fender*) I thought the figures that Sir Robert May produced recently were very revealing in that respect because in comparing our many competitor countries we attract more private money from industry, charities, per head of the population, than any other country in the world. Yet the Government contribution is the lowest of that comparative group by quite a long way. That is why I say there is a legitimate reason for investing more in research, whilst still recognising that even if you are doing that, researchers will want even more.

(*Mr Bekhradnia*) This ratio between the money provided by the Funding Council, in particular, and money coming in as grants and projects, is rather a key one. If our money is to provide the infrastructure, there is a limit to the additional research that can be built on to a fairly static infrastructure. That ratio is probably rather important.

Dr Kumar

314. Can I now move on to infrastructure and open up the debate a little bit more. Ron Dearing suggested the low-cost loan fund. First of all, do you see that as a workable proposal? If not, how could it be adopted to make it so?

(*Professor Fender*) You might say having a low-cost loan is better than having nothing. On the other hand, it does not look as if people are queuing up to contribute to this revolving loan scheme. I emphasise the government contribution that is being made, but we do need to attract as much private funding as we can. If you get the proposal right then you can get a mixture of private funding coming in to supplement the government funding. It has worked for equipment. I would like to think it could work for laboratory upgradings and refurbishments as well, but that has to be proved. We work alongside Wellcome, for example. It will require the initiative of universities to go out and make those alliances with industry which results in them wanting to back the infrastructure in the form of buildings with additional money. That is one approach. We will do it in other ways but as much as we can through that route. It still leaves the question.

315. Do you agree with Sir Ron Dearing that there is a £400-500 million shortfall on that as a figure?

(*Professor Fender*) That is not an over-estimate and I will tell you why. The figures that we got from the PREST survey indicated something like £450 million and that was actually before the cuts on the Funding Council money of 1994. Let us say that by our wits and by the collaboration with industry we cut that figure to £250 million, then I believe that the need to refurbish laboratories, particularly in the life sciences, is at least equal to that. Remember, this was addressing only the question of maintenance not the question of whether laboratories are fully furbished to meet modern requirements. I will give you a hard figure in January, but it is a very reasonable conservative estimate to say now that the laboratory needs of that kind are about equivalent to the equipment needs. That way you get £500 million as a minimum for the needs over five years.

Mr Turner

316. Dearing has suggested an arts and humanities research council. If there is no new money available for that, what would your reaction be to the other obvious alternative which is to take yet another bit from you to create this new research council? How would you react to that?

(*Professor Fender*) We would hope that the persuasive arguments for the humanities research council were good enough in their own right to unlock the purses. We would make a contribution to a humanities research council. We think it is very important. We think there ought to be one. Some of the activities, if we include arts as well as the humanities, will reflect activities that we want not just for personal development but, also, for our economic health in the next century. So we would be quite legitimate in making some contribution, but it could only be a partial contribution and given all the other pressures it will have to be pretty modest. I think we should press the case for an arts and humanities research council and look for support wherever we may get it.

317. There is another specific question that keeps being brought to my attention which is that some departments are having great infrastructural difficulties, particularly in support staff and technical staff and so on and there seems to be a fear that there may have to be closures of chemistry and physics departments in some universities so that you might end up in the worst case with just a few "super" chemistry and physics departments in a few universities with the obvious risk to other subjects

[**Mr Turner** *Cont*]
because of the enabling nature of those subjects for other faculties. Do you have any view of that and can you see any way of preventing that happening?

(*Professor Fender*) We very much hope that there would not be closures. There have been one or two relatively small departments closed so I do not think I am deeply concerned at that level, but you are quite right, physics and chemistry are generic subjects, are relied on by others and if there were rationalisations which threatened substantially more departments then, yes, we would be concerned.

(*Professor Williams*) I took a strategic decision that I wanted those subjects and would have to invest in order to have them. Of course, the ultimate answer is to have adequate student demand for the subjects and that has been the thing that has been eroded so badly in the UK. If the demand is there universities will have large departments for those subjects, but we still have a lot to do to persuade students that those are important subjects to do. Something has gone wrong since I did my physics degree 30 years ago and it has to be put right.

Dr Jones

318. How much of your £737 million research money is going into science and technology?

(*Professor Fender*) Up to 80 per cent, depending on your definition of science and technology.

319. What proportion is going into indirect costs of research?

(*Mr Bekhradnia*) Can I just modify what Professor Fender said? It is about £160 out of nearly £700 for science and about £100 for engineering and technology. Medicine, of course, takes another £130. It is about 40 per cent for science and engineering; medicine would account for another 15 per cent.

(*Professor Andrews*) It is higher in Wales, if I can give you the figures there. It is 35 per cent for science, 15 per cent for engineering and ten per cent for medicine, which gives 60 per cent.

(*Mr Bekhradnia*) It does depend on how you define it. Mathematics, for example, I missed out.

(*Professor Fender*) If you take £150 million for social sciences and humanities away from your figure you get closer to mine.

320. I think it would be useful if we could have a paper on that. Presumably when you are allocating the money you take into account the costs of people and also the indirect costs. What proportion is paid for indirect costs of research?

(*Professor Fender*) That is a question we would need to give you the detailed figures for because it will vary from institution to institution. Remember what our money supports. It supports basically academic salaries. It will then support—and these are the key elements which are, if you like, intensively shared aspects of the infrastructure—buildings, libraries and particularly expensive equipment on the one hand and consumable items on the other. That is what the Funding Council money goes on.

321. Do the universities have a duty to pass on these costs to the individual researchers? I notice that you are talking about work that is in hand to secure more information about indirect costs. What exactly is that?

(*Professor Fender*) The question of the degree of detail of costing that is desirable is a matter of some debate because you can spend a lot of money tracking down detailed amounts of expenditure. Remember that academics are involved and they are the most deeply shared resource. They are involved in teaching and research and also in supporting a number of different projects perhaps funded from different sources. If you are to get very accurate figures then you are into time sheets, you are into the sort of detail which I think would turn out to be rather counterproductive in terms of the commitment of individual researchers. They give a lot of their free time. They give up their weekends and they give up their holidays. If you start to wave bits of paper in front of them and say, "Please, will you record every hour what you have been doing," I think you would have a very bad reaction.

322. As a former academic myself I would agree with you!

(*Professor Fender*) As a manager I do not want to push costing to unreasonable levels. On the other hand, I think we are all in a world now where we should try to identify our costs and be transparent about those.

323. So what is this work you are doing to try and be more transparent?

(*Professor Fender*) We have got a group going with six universities led by the Scottish Funding Council which, in fact, is studying the degree of detailed break down of costing which is thought to be helpful to recommend to others.

(*Mr Bekhradnia*) As a matter of deliberate decision we do not fund universities according to costs. We give them a block grant effectively made up of teaching and research money, including the overheads. There is no other source of money from us with which to fund them. They have to fund their overheads and all their basic expenditure from that block grant. So we do not separately identify infrastructure costs or overhead costs or other costs and fund them explicitly and directly.

324. We have just been talking about the disbalance that has grown up because of the growth in research council and charitable and industrial funding. A lot of this expansion has been in the biological and medical research areas. To what extent does your funding have to follow that and is that creating some disbalance in the subject areas that your funding councils are supporting?

(*Professor Fender*) Remember that our funding for research follows largely academic staff but also, to a smaller degree, coupling, post-doctoral workers and graduate students. To that extent the growth within the universities is bound to be reflected by the number of academic staff they have and then the research funding follows that. That makes us responsive to what universities are planning in terms of their subject mix. Does that answer your question?

325. Are you happy with the areas which your funding is going into, for example physics and chemistry?

(*Professor Fender*) I do not think you or the sector would want us to have strong views about that because on what basis would we make it? It is far better that we respond intelligently to the demands

[Dr Jones *Cont*]
that universities are indicating and I think our funding methods do that. We do try to reflect the fact that project funding is weighted towards life sciences through the charities by providing an extra element in our funding which takes account of that and I think that is the right thing to do, but otherwise we respond in our funding to the number of active researchers, to the quality of the research in the group that they are working in and to the price of the subject under consideration.

Mr Turner

326. Dearing seemed to feel that by altering the RAE process we could get an improvement in the cost-effectiveness. What do you think?

(*Professor Fender*) I am not sure that Dearing gave the detailed reasons for that view.

327. I was hoping you might be able to identify them.

(*Professor Fender*) Some of the improvements in efficiency will come, as I said earlier, from better strategic planning and also by better management, particularly of people. I think it is our task to encourage collaboration and the sharing of equipment facilities wherever we can and we are doing that through the Joint Research Equipment Initiative, we are doing it through the Collaborative Research Scheme. We will do it in a number of smaller ways as we can and that way I hope we could be more efficient. We are certainly not in any sense averse to trying to squeeze the taxpayers' money out much further.

(*Professor Andrews*) I think the RAE itself has promoted efficiency because effectively it is challenging institutions to improve the quality of their research so that they are more competitive at the next exercise. This inevitably has had the effect of increasing productivity and increasing quality for the same amount of money.

328. The CBI have suggested that the nature of the research exercise encourages all university departments to develop a research capacity even when it is not necessarily appropriate for them to do so. How do you feel about that?

(*Professor Fender*) That is said. I think it is more in the rhetoric than in the practice. First of all, it is extremely difficult to shift from a relatively low research base to a higher one. It does require very great focus on a few areas and a very clear strategy about where one is going and we would not want to cut that off, nor would I want to see undergraduates educated in a university which had no research or development anywhere in it. What a bad environment, in my view, that would be. I think most institutions are realistic about how tough it is to increase their research funding. On the other hand, I would not want academics to be frustrated by being polarised along a teaching and research line and therefore I think it is up to the Funding Council or councils to do two things. One is to provide better rewards for teaching excellence. To promote teaching esteem is very hard, but important in order that an academic who is teaching primarily, who is not involved in contributing through the research assessment exercise, does not in any way feel devalued. I think that is extremely important.

329. What do you think of Dearing's proposal that people should get a *per capita* fee for scholarship? Do you think that would have an effect on relieving the pressure to conform to the research assessment exercise?

(*Professor Fender*) I think there are dangers in somehow separating scholarship from teaching generally in higher education. I think all teachers in higher education ought to be involved with scholarship as a matter of norm. So the idea of having some teachers which were specially scholarly is not necessarily the best route to go. I think we need to find ways of rewarding good teachers and having people wishing to be, first of all, good teachers. That is one route. The other route which I am trying to encourage people to think about is to take a range of applications of higher education and by that I mean technology transfer, consultancies, the building up of university companies or spin out companies. There is a whole range of professional activity, including specific training, which is derived from teaching and research but is not simply teaching or research. Those applications of higher education I think would provide very good motivation for quite a large number of academics who are not, first and foremost, pointing towards research. It would give a strategic third dimension which would certainly mean that an individual would have these three choices rather than at the moment being confined to two.

(*Professor Andrews*) I must confess that I am slightly concerned at a proposal which in effect is bribing institutions not to go into the research assessment exercise. I think there are very real dangers there. You could end up with a department receiving funding for scholarship which, had it gone into the research assessment exercise, would be nowhere, but a department that chose to go in and had a two rating would have no money for scholarship at all. If one is going to introduce some process which causes institutions or departments to think carefully before going into the RAE, I think I would rather introduce a levy for the cost of the whole exercise according to the number of staff submitted, or something of that sort, which I think would be a more honest way of going about it.

330. The other difficulty is the fact that the research assessment exercise measures past performance and that is not necessarily a guarantee of long-term development of future excellence. Can you see any ways of improving the approach so that we guarantee that we grow new excellent research not simply continue to reward those who have done it in the past?

(*Professor Williams*) Remember the dual support system. The research council project grant is about rewarding groups that are thought to be good now and likely to be good in the immediate future. I think it is not inappropriate, as long as the accountability mechanisms are there, that the Funding Council research money should recognise continuing quality, which is what effectively it is. From research assessment exercise to exercise there is a change, some departments coming up and some going down, but the Funding Council is essentially taking overall

[**Mr Turner** *Cont*]
responsibility for the national infrastructure and some institution has to do that. This is the thing I think that is often forgotten. The research councils, quite properly and naturally, are charged with ensuring the quality of research, but there are also universities in this and the funding councils have responsibility for the health of the universities. So if it is the case, let us say, that a department has slipped a little, that will be reflected in the research assessment exercise. It will not be caught immediately, but it will be caught and I think the two things put together, research council funding going into projects for the future and the state of play now and the funding councils reflecting the underlying strength or otherwise, is a very good method of getting a decent balance, plural decision-making and recognising the two elements, the stability and the opportunity.

331. What you say makes sense except, of course, that applicants for project funding are also to a large extent judged on their existing standing based on past work. So it is still loaded against the newcomer.

(*Professor Fender*) We always hire people on their past record. We do not know what they are going to do in the future. We just make an intelligent assumption about how they are going to perform in the future.

(*Professor Andrews*) One problem with the RAE is that we judge departments on the basis of a snapshot, the people in that department on a particular point in time. The earlier exercises were not conducted in that way. I still have some misgivings about that. I still think in many ways we would be better if we looked at the performance of the department across the years leading up to the research assessment exercise. It would remove the advantages of last minute transfers of staff, this sort of thing, which are probably exaggerated but they do take place. The attraction of that is in a sense you would be looking at the moving average of the department and the department that was bringing on a succession of young scholars would take the credit for it and could continue with that profile. Its profile of performance could change but it would change over a period of time. Rather as Roger Williams is saying, you would have the profiled department with the infrastructure, with the record moving gently and the project funding would then come in and be driven by these people in that department.

(*Mr Bekhradnia*) The trouble with that, of course, is it takes us even further into the past. You would be judging departments on the basis of staff that may have left two or three years previously, whereas at least with the present method you are judging departments on the basis of the staff who are there as of the date of the assessment. This was precisely the debate that was had in 1992 when the decision was taken that it should be a snapshot exercise because it was as close as we could get to a prospective review. It was still as of the past but at least it was based on the people who were in the department.

(*Professor Fender*) I am not going to get drawn into this discussion. It is all here in this document. This is the consultation paper on the next RAE. Everybody can join in. Every suggestion is welcome. We will try to make sense of it at the end.

(*Mr Bekhradnia*) We put the pros and cons there.

Dr Jones

332. Is this your way of responding to Dearing's suggestion that you should commission a report on the issue or is this something that you were doing anyway?

(*Professor Fender*) On one or two specific subjects we will commission a report with the research councils, for example into interdisciplinary research, so that it has it been properly looked at. As to the general question of the shape of the next exercise, it is a very open-ended consultation and that will clearly be a major part. We will also go back, as we did last time, to examine the 1996 exercise, how it impacted on institutions, so we will be informed by what people think from the point of view of consultation and also by appropriate studies.

Mr Beard

333. Do you accept the criticism that has been raised that the RAE penalises multidisciplinary research?

(*Professor Fender*) I think it is exaggerated. There are a number of exaggerations around. I think that is probably one of them and certainly if you look at the constitution of the panels you might worry a little bit about that, but I think the truth of the matter is that within disciplines individual researchers have become more interdisciplinary conscious or more used to working in a multidisciplinary way. So I think in practice I would be rather surprised if we found we were being too hard on them.

334. I think that is the trend but do they get credit for it in the assessment exercise?

(*Professor Fender*) That is what we are trying to find out but my guess is that they are getting credit.

335. The Dearing Report suggested this needed looking at.

(*Mr Bekhradnia*) And that is precisely what we will do. I think it is true to say that one of the most difficult aspects of the RAE is the handling of interdisciplinary work because it is by its nature a discipline-based assessment process. There are quite a lot of mechanisms in the RAE to enable interdisciplinary research to be looked at, and it has certainly been done better in 1996 than in 1992. One of the things we hope from our study is to see whether and how we can do it better.

Dr Jones

336. Thank you very much. We have come to the end of our questions. We have very little time but if there are any important points that you feel we have not covered and you would like to make, I would be happy to allow you time to do that.

(*Professor Fender*) I had three key issues and you have covered them very well.

Dr Jones: Thank you very much. It has been very helpful.

Supplementary Memorandum submitted by the Higher Education Funding Council for England

Further to your letter of 22 January, when you asked about my reference during the Committee meeting on 3 December to a hard figure for the amount of money needed to bring university research infrastructure "up to standard". This statement was based on my expectations of a study we have commissioned from the consultancy group Segal Quince Wicksteed. Unfortunately, the work they are undertaking, which includes analysis of income and expenditure of universities in the UK and abroad, has proved more complex than they originally envisaged and they will not be in a position to provide an interim report to us until the end of February.

I will of course provide you with a copy of the interim report from SQW as soon as it becomes available. However, in the meantime I thought it might be helpful to explain more fully the basis for the figure that I quoted to the Committee.

Our submission to the Committee made reference to the work we commissioned from PREST, published in 1996, which identified a requirement for research equipment expenditure of £474 million. It was acknowledged at the time that this was a survey of researchers' opinions rather than an objective assessment of need; it asked researchers to identify the five most needed items over £14,000 (excluding computers) required to enable them to undertake the research projects they expected to be funded for over the next five years. One might therefore legitimately scale back that figure by 25 per cent to move to a needs based assessment of £355 million. If one then subtracts from that figure the sums provided by the Joint Research Equipment Initiative (JREI) in 1996 (£50 million) and 1997 (£80 million), one arrives at a figure of £225 million for equipment needs.

One must add to this the funding required to bring the physical premises up to scratch. A recent HEFCE estates survey identified 200,000 square metres of obsolete research laboratory accommodation in the higher education sector which will cost in the order of £200 million to refurbish.

The infrastructure requirement from adding together the estimated equipment and premises needs may therefore be calculated as £425 million. Supporting evidence for a value of this order is provided by the SQW study, submitted to the NICHE that, using an entirely different basis, estimated the infrastructure gap as £445 million.

If the Council can be of any further assistance please do not hesitate to contact our Head of Research Policy—Dr David Pilsbury on 0117 931 7123.

9 February 1998

Memorandum submitted by the Biotechnology and Biological Sciences Research Council

INTRODUCTION

1. The BBSRC was established in April 1994, incorporating the assets and responsibilities of the former Agricultural and Food Research Council, and the work of the Biotechnology Directorate and the Biological Sciences Committee of the former Science and Engineering Reseach Council. The Council will receive £183 million in 1997–98 from the DTI's Science Vote, to support high-quality basic, strategic and applied research, postgraduate training and the public understanding of science in the bio-sciences.

2. The Council sponsors eight research institutes, each of which is a charity and an independent company limited by guarantee. Over half of the research income to the institutes comes from sources other than the BBSRC Science Vote, primarily from the Ministry of Agriculture, the European Union Framework Programme, industrial companies, and grower/producer groups. Some 2,500 scientists are employed in the institutes on BBSRC conditions of employment, representing a significant element of the science base in the biological and related life sciences. The Council is also a major funder of research within the universities. Over 2,000 Research Assistants, Research Fellows and technicians are employed on grants from the BBSRC, predominantly in the biological sciences, bio-chemistry and engineering. The Council also supports 2,000 research students, almost all of whom are undertaking doctoral research in the universities.

3. The UK has an outstanding research base in the biosciences, and a strong bio-industry sector. In a recent comparative analysis, the UK featured in the top three nations world-wide in each of 10 sub-disciplines within the bio-sciences (Science, February 1997)

- The UK leads Europe with over 200 biotechnology SMEs; and the five biggest UK biotechnology companies would rank among the top 20 in the USA by market capitalisation.
- The Europabio 1997 Report predicts a 20 per cent compound growth rate for European biotech products under a favourable social and economic environment. This would produce a ten-fold increase in employment to around four million by 2005.

The capacity of the UK to capitalise on the enormous economic potential of the new biosciences is dependent on maintaining the innovative drive of the science base. The government's response to the NCIHE report as it affects research funding is therefore of fundamental importance for the future of this country. Without additional resources for the biosciences, either as new money or transfers from elsewhere, the opportunity which lies within our grasp will not be fully realised.

SUMMARY OF EVIDENCE

The Committee has endorsed the analysis of UK research and research funding which has been widely advanced in recent years:

- The current level of funding for research is barely sufficient.
- Despite the lack of investment, UK researchers are internationally competitive, but this position is being gradually eroded.
- Selectivity and targeting of infrastructure and other research-related expenditure is vital.
- Research contracts taken on by universities at less than full economic cost is creating an overheads "funding gap" which is putting a severe strain on the dual support system.
- Infrastruture funding is seriously deficient by comparison with the US and the leading scientific nations within the European Union.

Although this analysis is convincing, the proposed solutions are confused and inadequate. An increase in the overhead rate on Research Council grants cannot be justified until the universities have introduced effective internal accounting systems, and even then such an increase would not close the "funding gap". This would require major changes in the rules governing key contractors' funding policies. If the overhead rate is to be increased, it would most appropriately be funded by a transfer from the Funding Councils. Any increase in government funding should go to support the massive potential of the biosciences for economic growth in the next century, not to cross-subsidise research in universities for the private and charitable sectors.

BBSRC doubts whether a "revolving fund" for infrastructure can be established, and would prefer to see an expansion of the Joint Research Equipment Initiative into a coordinated HEFC/Research Council initiative for selective funding of large equipment at key regional centres.

BBSRC considers the proposal for an Industrial Partnership Development Fund to be ill-conceived. Existing schemes are well understood and have distinctive separate rationales. It is wrong to divorce collaborative funding activities from the wider activities of each Research Council. We doubt whether "modest but worthwhile applied research projects" are being squeezed out, but if the government wishes to shift funding in support of applied projects, Ministers simply have to ask for a change of direction. There is no need for a monolithic and inflexible unified fund.

The Council supports the proposals for alterations to the research assessment exercise and for addressing the disincentives to interdisciplinary research. We agree that the CST has not played a significant role in providing advice to Government and its role should be reconsidered.

PROPOSALS FOR AN INDEPENDENT ADVISORY COUNCIL ON NATIONAL RESEARCH POLICY

4. The transfer of the Research Councils from the Department of Education and Science to the newly-created Office of Science and Technology following the 1993 White Paper, created on institutional split between the two streams of dual support. To deal with common concerns, the Science and Engineering Base Co-ordinating Committee was established to promote communication and coopertion between the education departments, the Higher Education Funding Councils, the OST and the Research Councils. It is not the SEBCC's role to provide a national policy advisory function for government, nor does it provide a vehicle for assessing the performance of the public funders of research.

5. These functions are carried out by the OST itself. The roles of the Chief Scientific Advise and the Director General of Research Councils involve the provision of advice to Ministers on the three issues identified in recommendation 35: the direction of national research policies, the distribution and level of funding, and the performance of the bodies which fund research across the science base. The Council for Science and Technology was established to provide a forum in which key policy issues coud be debated by a wider group of scientists and users of research. In practice, it has met infrequently and has played an insignificant role in steering research funding policies.

6. If it is to play an effective role of the kind envisaged by the Dearing Committee, such a high level body would require a small, high-powered Secretariat and would need to report to both DFEE and DTI Ministers. It might have parallels with the modus operandi of the parliamentary Select Committees; ie undertaking strategic reviews and analysis of selected key issues leading to well-argued recommendations to Ministers. It would probably be most appropriate for it to be located within the Chief Scientific Adviser's office, despite the difficulty that this is within the DTI. An alternative would be for the council to be independent of the

two key departments which fund the HE sector, and located in the Cabinet Office. It is worth noting that Professor Allegre, the French Minister for Higher Education, Research and Technology, has recently announced the establishment of a personal advisory board, half of whose members will be drawn from other European countries.

ALTERATIONS TO THE RESEARCH ASSESSMENT EXERCISE AND THE BALANCE BETWEEN TEACHING AND RESEARCH

7. These are sensible recommendations which BBSRC supports. The objective of the research funding system should be to encourage selectivity and excellence, while supporting diversity in objectives and activities across the science base. The distinction between research of national excellence and scholarship primarily in support of teaching is a good one, and the procedure proposed by the Committee would lead to a substantial improvement in the cost effectiveness of the RAE. While BBSRC will doubtless continue to direct the bulk of its funding to departments at grades four and five, applications for grants from researchers in lower grade departments would continue to be considered against the usual criteria of excellence, timeliness and the suitability of the research environment.

8. In the Council's internal research assessment exercise for its sponsored institutes, the practice of including one or more member from outside the UK has already been adopted. Care has to be exercised in the choice of these members, to ensure that their field of expertise genuinely reflects the field covered by the panel.

FUNDING FOR RESEARCH INFRASTRUCTURE

9. We doubt whether a "revolving fund" could be established given the hostility from the private sector to such an open-ended commitment of resources. If such a fund were established, and maintained by income from universities charging a realistic overhead rate to the Research Councils, the effect woud be to shift a significant responsibility for infrastructure from the HEFCs to the Research Councils with a consequential reduction of the volume of research supported. There would be a further level of administrative complexity for the Councils if the indirect cost rate varied by department or UoA, linked their use of the revolving fund.

10. Current systems for funding equipment and infrastructure fall broadly into three categories: block-funding via the Funding Council's, peer-reviewed grant funding, and contract funding. Block-funding has been reduced in recent years but is the only really flexible source. Grant-funding against a research proposal (whether to a Research Council, charity or private industry) ties equipment provision to a specific programme of work and with low success rates, planning becomes very difficult. Additionally, generic equipment that is essential to the operation of a laboratory but which has such wide application that it cannot be bought with a single grant poses particular funding problems.

11. The BBSRC reviewed the portfolio of capital equipment in the biosciences in 1995. The recommendation to the Council was that some £10 million should be spent annually on large capital equipment in order to achieve an internationally competitive research base. Since that date, the Joint Research Equipment Initiative and the parallel BBSRC institute capital equipment initiative has supported an annual investment of £5 million; a further £5 million needs to be found and BBSRC would support an expansion of the JREI under revised and slightly more flexible rules.

12. Additional government funding should be accompanied by greater concentration of resources and a substantial increase in the access offered to researchers from outside the selected institutions. Regional centres will need to be developed in a coordinated way by the Funding Councils and the Research Councils.

THE FUTURE OF THE DUAL SUPPORT SYSTEM AND THE ROLES OF THE RESEARCH COUNCILS AND HIGHER EDUCATION FUNDING COUNCILS

13. The key elements of the Committee's analysis of research funding in chapter 11 of the Report can be summarised in the following terms:

— Funding for research is barely sufficient (11.6, 11.12)

— Despite the lack of investment, UK research is very competitive internationally (11.7)

— Selectivity and targeting of funding is vital (11.11)

— Non-government funding of university research is creating a "funding gap" which is severely straining the dual support system (11.17–11.21)

— Infrastructure funding is seriously deficient (11.32–11.37)

14. The Committee's proposed solutions for the difficulties which they have correctly identified are, however, inadequate.

- The key need for further targeted funding to capitalise on the UK's strengths in the biosciences is not mentioned. Unless the government grasps this issue firmly, the benefits of funding over the past two decades may be lost just at the point where the impact on industry and society is becoming of key significance.
- The "funding gap" will not be resolved by simply increasing the overhead rate to 60 per cent, or a higher percentage, particularly if the additional money is found by transferring resources from the HEFCs to the Research Councils or from within the present Research Council budgets.
- The required increase in infrastructure funding is unlikely to be found from the mixture of private, charitable and public sources proposed for the Revolving Fund.

15. Chapter 17 of the report indicates that the Research Councils fund only 22 per cent (£532 million) of total research income (£2,357 million), while industry, charities and other private sources provide 25 per cent. The growth of this non-Research Council funding at less than full economic cost is the principle source of the funding gap. The most rational response therefore, is the one embraced by the 1993 White Paper "Realising Our Potential", which clearly stated that universities should introduce effective internal accounting systems to enable them to charge the full economic cost for research. Neither government nor the HEFCs have taken this forward. Why not?

16. The main reason for the development of the gap is that universities have been operating in a system which has encouraged research volume to increase, but where the key "external" funders (charities, EU and the private sector) are reluctant, for either policy or financial reasons, to pay for the overheads to support a research infrastructure which they consider to be a national resource.

17. The POST report of June 1997 doubted whether a clearer policy on FEC and good accounting systems would in themselves solve the funding gap, since major changes would also be required in the rules governing key contractors' funding policies (eg the charities and the EU). If the link between the vitality of the research and science base and future growth and competitiveness is accepted, there is a strong policy argument for bolstering the HEFC leg of dual support to improve research infrastructure, provided that mechanisms are created to ensure that these funds are used for this purpose, and not siphoned off elsewhere in the university system.

18. A significant increase in the overhead rate for Research Councils would achieve a similar outcome, as would an expanded JREI/Laboratory refurbishment programme. The issue has become confused by self-interested arguments about the precise delineation of the RC/HEFC boundary. The urgent requirement is to bring infrastructure/overhead funding into balance with the actual volume of research; how it is achieved is arguably less important.

19. The current Research Council overhead rate of 45 per cent was based on a detailed analysis of universities' costs. The BBSRC is prepared to accept the principle (11.13) that the Research Councils and other funders should pay the full cost of research, but cannot accept the imposition of a 60 per cent rate which is not based on any reliable analysis. Unless robust accounting systems are introduced to identify the full cost of research, such as those which BBSRC applies to its sponsored institutes, the inadequacies of the present arrangements will continue.

20. The proposal for a system of variable indirect costs levels of between 60 per cent and 100 per cent would be expensive to manage. US experience demonstrates that it is workable if annual institutional rates are approved by a "lead" public sector funder based on national guidelines, and then adopted by all other public sector bodies. Complex changes to the Research Councils' computerised grants systems would be required.

21. Of the options suggested for meeting the cost of a higher overhead rate, the proposal to reduce research volume is not consistent with the general conclusion that research funding is already barely sufficient. The BBSRC would want to see an increase in government funding of the bio-sciences to capitalise on the burgeoning opportunities in a highly competitive world market, rather than to cross-subsidise research contracts for private or EU client. The third option for increasing indirect costs of transferring £110 million from the Funding Councils to the RCs is the only practicable solution to this particular problem.

Funding for Interdisciplinary and Collaborative Research Projects and the Sharing of Research Facilities

22. The Research Council's commitment to inter-disciplinarity is not sufficiently acknowledged in the report. The sponsored institutes supported by BBSRC, MRC and NERC, and the Interdisciplinary Research Centres set up by all Councils over the past decade, bear testimonny to the importance which we attach to fostering cross-disciplinary approaches to many important areas of research. The Councils and other mission-oriented funders such a the medical charities, have a good record of developing new centres, programmes and initiatives with disciplinary mixes which reflect the needs of an emerging research area. At the present moment, for example, BBSRC is driving forward a TSE programme, linking molecular biology, epidemiology and immunology; a bioinformatics programme bringing together IS specialists and geneticists; and in partnership with MRC, Glaxo-Wellcome and DoH, is funding the Jenner Institute for Vaccines

Research where scientists from a variety of disciplines are exploring the development of new vaccines. Our research programme on environmental aspects of agriculture link agronomists with biochemists and population biologists.

23. We accept the concerns expressed by the Committee that the effect of the RAE methodology is to discourage interdisciplinary work and the formation of new and risky partnerships. However, the suggested investigation of this issue by, for example, the Royal Society does not seem the most appropriate way of dealing with this problem. Rather, the Funding Councils should be asked to come foreward with their own proposals for removing the disincentives that are inherent in the present systems and to conduct an open debate with the government and the science community on the methodology of the next RAE.

Proposals for an Industrial Partnership Development Fund (IPDF)

24. The IPDF is envisaged as an "umbrella" for all national schemes to support applied research. It would have a specific focus and strategy for funding, managed separately by the DTI, Scottish and Welsh Offices, funded on a 50:50 basis with industry. The public funding element (some £50 million) would be transferred out of the Science budget or managed as an earmarked fund within that vote.

25. We do not believe that the Committee's reasoning in this area is well-founded and we are not aware of any evidence to support the contention that potential users of these schemes are confused about them. While the extensive range of schemes to support collaboration between universities and industry should be reviewed to see if some degree of rationalisation is possible, each of them has a distinctive rationale and was set up to meet a specific objective. CASE, for example, promotes collaboration in postgraduate research training; LINK promotes collaborative research on applied topics; and the Teaching Company Scheme is designed to promote technology transfer. A single funding stream risks becoming monolithic and inflexible.

26. It would be wrong to divorce collaborative funding schemes from the wider activities of each Research Council. Each Council tailors its technology transfer/industrial collaboration policies to the characteristics of its user communities. These communities are extensively represented within the decision-making structures of the Councils. Councils also ensure that there are strong internal links between strategic/applied research and the relevant underpinning science. These crucial linkages would be lost if a single IPDF were established, and managed outside the Research Council structure.

27. A clear recent example of how the BBSRC has reoriented an existing provision (the Teaching Company Scheme) to meet the particular requirements of its own industrial users, has been the introduction of postdoctoral Teaching Company Associates to high technology SMEs. The "standard" TCS model of associates at the graduate level has not been found to be appropriate to the needs of the fast-growing biosciences sector.

28. The ratonale on para 11.74 for setting up this Fund is that the severe competition for funding is resulting in "modest but worthwhile applied research projects" being squeezed out. No evidence is presented to support this concern, and there also appears to be an incorrect assumption that collaborative research projects will necessarily be applied in nature, when many in fact address strategic or basic issues. It is open to Ministers at any time to advise the Research Councils, the DTI/OST and all other government departments with research budgets that they should maintain or increase funding specifically for applied projects. There is no need for an additional and separate funding mechanism.

23 October 1997

Memorandum submitted by the Medical Research Council

1. Introduction

1.1 The Medical Research Council is the UK's principal funder of basic, strategic and applied medical research. This year MRC will spend about £322 million on research in its own units and institutes (almost all within Universities) on grants to University and Hospital teams and centres, and on training and career development.

2. Key points

- The research funding model for the future should be based on flexible, open partnerships between Universities and research funders, rather than on balancing funding streams at a national level. Individual Universities need to take more responsibility for managing their investment in infrastructure and in people for the longer term.
- Universities' costing, budgeting and planning systems need to be improved and made more transparent.

- Extra funding for infrastructure is needed to keep pace with scientific developments worldwide. However, the causes of past under-investment in Universities also need to be addressed, and a move to full overheads on Research Council grants would be an effective way of earmarking new funds for infrastructure.
- Increased Research Council overheads without new funding would mean severe cuts—of 22 per cent or more—on some of the best and most productive parts of the UK science base. It would cause irreparable damage to many research programmes, and would fail to solve infrastructure problems.

3. An Independent Advisory Council on National Research Policy

3.1 The 1993 White Paper saw extensive changes for the system for oversight of the science base—including the creation of the Council for Science and Technology, the Office of Science and Technology, and the post of Director General of the Research Councils. These changes are now settling down effectively, and there should be no need for an additional layer of oversight.

3.2 Sir Ron Dearing's vision seems to have entailed a small body comprising only academics and industrialists, offering private and unpublished advice.[1] But both research itself and its interactions with society and the economy are highly complex and diverse. There is always a risk of providing misguided advice, and policy development must involve a wider range of stakeholders, and must be subject to open scrutiny.

3.3 MRC's view is that there is more to be gained by improving the effectiveness of CST than by creating an entirely new body.

4. Alterations to the Research Assessment Exercise, and the Balance Between Teaching and Research

4.1 MRC recognises the need for Universities to think strategically about their research role, and agrees that for many departments, greater emphasis on scholarship, and less on research is the way forward.

4.2 We support the principle of a further increase in the threshold for Funding Council research funding, and support for scholarship in non-research departments. However, scholarship must be broadly defined, to include, for example, the review and dissemination of research, and collaboration with researchers in regional centres of excellence.

5. Proposals for a Loan Scheme

5.1 The principle of low-interest loan funding for University research equipment, buildings and other facilities is attractive, insofar as it would encourage a discipline of longer term planning and budgeting for research infrastructure. Ventures would also, inevitably, involve greater dialogue between the University and research funders on their long-term aims and strategies.

5.2 But NCIHE's proposals are unworkable. Research funders cannot be expected to divert funds from high quality research into a general, unaccountable, fund which might or might not advance research in their areas of interest, and which is not co-ordinated with their own investments in the sector. Some new thinking is needed if this is to work.

6. The Future of the Dual Support Funding System

6.1 The dual support model needs reform. The model's aim of allowing Universities scope to develop new ideas and ventures must be preserved. But the aim of providing well-found laboratories through the block grant is no longer viable. Responsibility for the quality of research infrastructure is fragmented between Universities, Funding Councils, Research Councils and other funders, such as industry, charities, and Department of Health. It is now impossible for central government to ensure the right balance of investment by adjusting funding streams: responsibility has to shift towards the Universities.

6.2 The model for the future should focus on developing the relationship between Universities and research funders. World class research increasingly calls for large, multidisciplinary teams with first rate facilities and stable funding—developed by funders and Universities sharing responsibility for a common strategy for each centre or programme.

6.3 MRC, charities and industry will need to shift to longer term support for teams and centres, to provide more productive research and training environments. Three-year project funding will, increasingly, be worthwhile only as an "add on" to larger teams and centres.

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[1] Evidence to House of Lords Select Committee, July 1997.

6.4 At the same time, we need more precise and more open costing, budgeting, and planning within Universities. The problem is broader than just improving cost recovery on contract research. Universities also discourage funders from investing in infrastructure when they cannot translate shared responsibility for research centres or programmes into shared financial plans.

7. UNDER-INVESTMENT IN INFRASTRUCTURE

7.1 There is significant under-investment in infrastructure in the biomedical sector. This is the result of:

- increased sophistication of research approaches;
- pressure on Universities to invest in increasing the volume[2] of research as well as quality, at the expense of infrastructure; and
- growth in research funded by industry, charities, and the EU, coupled with poor cost recovery.

7.2 Some commentators have pointed to the general increase in Research Council funding in Universities over the last 10 years, and the modest decline in Funding Council block grants, as the main cause of infrastructure problems[3]. This neglects the complexity of the funding system:

- only part of the Funding Council block grant is invested in infrastructure, and the balance between investment in infrastructure and volume is the responsibility of Universities, not the Funding Councils. The actual level of investment is unknown.
- important infrastructure funding is provided by sources other than the Funding Councils, including Department of Health, charities, industry, Research Councils, and Universities' own funds.

7.3 At the same time as tackling the reasons for under-investment, extra funding for research infrastructure should be a high priority for government, to reflect the increasing sophistication and cost of internationally competitive research. The funds must be effectively earmarked for this purpose.

8. MRC'S RESPONSIBILITY FOR RESEARCH FUNDING

8.1 Over the last 10 years, MRC has changed its role as a funder. We increased support for postdoctoral careers as level funding for UK higher education meant fewer career opportunities for outstanding young scientists in Universities. We expanded funding for infrastructure and support staff in University centres through new grants, and by establishing Interdisciplinary Research Centres.

8.2 This year, MRC introduced major changes in its funding schemes to help improve University research and training environments. More funding will be for longer-term centres, programmes, and co-operative grants, developed in close discussion with Universities. The new schemes will encourage sharing of facilities, and will make it easier for MRC to invest effectively in infrastructure. They also provide special support for new researchers and teams and for high risk projects. Most important, they introduce a new degree of strategic co-ordination between MRC and Universities.

9. RESEARCH COUNCIL OVERHEADS

9.1 The current 45 per cent overheads were conceived as a token rate, partly to encourage cost-awareness in Universities. Moving to a full overhead, which reflected the real costs of each centre, could be a very effective way of delivering earmarked infrastructure funding to the best centres, and it would be a powerful stimulus for better costing and budgeting.

9.2 Full overheads should be introduced if additional funds can be provided. If they cannot, funds should be transferred from the Funding Councils. A transfer would not increase the total research funding available, but it would help ensure appropriate investment in infrastructure, and encourage higher standards of costing and budgeting.

9.3 NCIHE's third option of cutting Research Councils' grants to fund higher overheads would weaken the science base. The Medical Research Council sets the standard for high quality, original research in its field, as well as addressing the nation's health needs and contributing to the economy. Full overheads would mean cuts of 22 per cent or more in research, training and careers. There are arguments for reducing the overall volume of UK research to improve quality and infrastructure, and it is certainly true that the numbers of research active staff[4] in Universities have been increasing over the past five years. But cutting the most productive research in each sector is not the solution.

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[2] See, for example "The impact of the 1992 RAE on Institutional Behaviour in English Higher Education: evidence from a research project". A report to HEFCE by Professor Ian McNay, May 1997.

[3] The trends were highlighted in the POST report "Striking a balance: the future of research 'Dual Support' in higher education". The Royal Society's response to the report presents this as the cause of the problem.

[4] RAE statistics show a 12 per cent increase in research active staff entered in the RAE between 1992 and 1995 overall, and a 24 per cent increase in staff among Departments rated 3b—5* for funding.

10. INTERDISCIPLINARITY AND COLLABORATION

10 NCIHE misjudged the scale of organisational barriers to interdisciplinary research and sharing facilities. Multidisciplinary working is vital to many of the most important areas in medical research, and MRC will continue to take active steps to encourage interdisciplinarity and sharing, through its new funding schemes and other routes.

11. INDUSTRIAL PARTNERSHIP DEVELOPMENT FUND

11. There is no case for re-organising the funding schemes mentioned by NCIHE into a new, separate, administration. Different scientific and technological areas have different needs, and fostering academic/industry collaboration, and developing research manpower relevant to industry should remain an integral part of the mission of each of the Research Councils.

22 October 1997

Memorandum submitted by the Engineering and Physical Sciences Research Council (EPSRC)

INTRODUCTION

The Engineering and Physical Sciences Research Council is one of six research councils providing government funding for research and postgraduate education and training to higher education institutions in the UK. Specific reference to the role of the research councils in research in higher education is made in the Dearing Report.

SUMMARY

- The need for an independent advisory council on national research policy is questioned.
- The proposed changes to RAE must not pre-empt research council support of good quality research wherever it is pursued.
- Proposals on availability and enhancement of publicly funded IT systems are supported.
- Infrastructure in top quality departments must be improved. The viability of the proposed loan scheme is questioned.
- True indirect costs should be met by funders of research projects. Government should provide additional funds to enable this.
- Proposals on interdisciplinarity and collaboration are supported.
- The creation of an IPDF is not supported.

ISSUES

Proposals for an independent advisory council on national research policy

We question the need for an additional independent advisory council on national research policy. There already exists a number of bodies (eg CST, SEBCC) whose responsibility is to look more broadly at all, or part, of public expenditure on research (in HEIs).

Alterations to the Research Assessment Exercise and the balance between teaching and research

With respect to the proposed changes to the Research Assessment Exercise the vast majority of EPSRC funding is in institutions and departments which we would expect to enter, and score highly in, the next Research Assessment Exercise. Nonetheless, we regard it as important that we retain the ability to support good quality, innovative research wherever it is being pursued. That implies that adequate, underpinning support should be available where it is needed.

The availability of and access to publicly-funded IT systems by researchers and others

EPSRC supports recommendations 27 and 28 which aim to enhance the availability of, and access to, publicly-funded IT systems by researchers and others.

Proposals for a research equipment loan scheme funding for infrastructure

EPSRC strongly supports the improvement of infrastructure in top quality departments. The success of the proposed research equipment loan scheme is by no means certain. It remains to be seen whether all the proposed partners to the loan fund will be willing to contribute on an adequate scale and questions remain as to the viability of the payback mechanism. The objective must, however, be achieved through some source of additional funding.

The future of the dual-support system and the roles of the research councils and higher education funding councils

The proposal to increase indirect costs paid on research grants is a particularly important one. If research projects are to be successful it is essential that the true level of these indirect costs is covered. To provide such additional funding from within existing research council budgets would considerably reduce the volume of research supported; this would have serious short and longer-term consequences. Transfer of funds from the funding councils to the research councils would not address the intention of the Dearing Report—to reinvigorate the research base—as the baseline funding for research would not be increased by such a transfer and therefore university infrastructure would continue to deteriorate. Research councils should, therefore, be provided with additional funding from Government to meet the costs.

Funding for interdisciplinary and collaborative research projects and the sharing of research facilities

We support the proposals to review interdisciplinarity and collaboration. We will consider whether, for example, our own grant conditions could be felt to inhibit collaboration and whether, indeed, some extra funding is needed to facilitate collaborations where they are clearly desirable in the longer term. An important impetus to collaboration could be provided through encouragement of collaborative submissions to the next Research Assessment Exercise and subsequent Funding Council allocations for inter-institutional collaborations. EPSRC recognises the importance of sharing research equipment and supports both national and international facilities where this is desirable.

Proposals for an Industrial Partnership Development Fund

The proposals for an Industrial Partnership Development Fund do not clearly explain which existing schemes would fall within its umbrella but by implication it would include some currently funded by EPSRC. The Council is not convinced of the case for this additional funding stream. The main disadvantages would include: extra interface problems; and retention of a mission for EPSRC implying wealth-creation through, inter alia, the formation of university/industry collaboration but no retention of the funds. However EPSRC does support the thinking behind this recommendation, namely to improve the industrial participation in collaborative funding schemes. The approach here should be a simplification of existing schemes to improve understanding and industrial accessibility. EPSRC is presently considering rationalisation of its own schemes with such an objective in mind.

ADDITIONAL COMMENTS

Clearly there are broader implications arising from other recommendations in the report which will affect the work of the research councils over time. For example the consequent effects on postgraduate recruitment of the introduction of undergraduate fees should not be underestimated and must be prepared for. Additionally there is much to be clarified in the detail of implementation of the recommendations (where they are to be pursued).

22 October 1996

Examination of Witnesses

PROFESSOR GEORGE RADDA CBE, Chief Executive, MR NICK WINTERTON, Executive Director, Medical Research Council, PROFESSOR RAYMOND BAKER, Chief Executive, Biotechnology and Biological Sciences Research Council, PROFESSOR RICHARD BROOK OBE, Chief Executive, and DR DAVID CLARK, Director of Science and Engineering, Engineering and Physical Sciences Research Council, were examined.

Dr Jones

337. Welcome to the Committee. I am sorry we kept you waiting. You would have been very welcome to come and listen in on the earlier session. We have our questions and I propose, because we are running a little late, to launch straight into them, but if there are any points that we miss, I will be very happy to give you the opportunity to make them at the end. Could I start by launching straight into the first question, which is: what are the causes of under-investment in universities? Who would like to have a stab at that, assuming you actually agree with the statement?

(*Professor Radda*) I think that is one of the generally-agreed points, that there is, in fact, under-investment, and you will see that almost everybody who has contributed to this discussion agrees that it is largely in the infrastructure and the inability to replace outdated equipment and buildings and refurbish laboratories. I would add to that that I think there is under-investment in universities in terms of technical support as well. I would regard technical support and that kind of thing as also part of the infrastructure.

(*Professor Brook*) You were asking as to the causes, were you not, which is a harder question? I think there comes a point when, say, those from the research councils should speak primarily for under-investment from the research councils' side rather than widening the picture, but if you invite us to do that no doubt we shall be tempted to do it. I think it has been a success of recent years that the Science Vote has held relatively stable. This has provided a climate where, at least in the support of the research of the individual and individual groups and teams within universities, the quality of the research has been sustained.

338. I am sorry, the point about the causes. It sounds as if you are fairly happy, then, with the research council side of things. We heard in the earlier session about a disparity in the growth of individual project funding through the research councils, through industry, through the charities, which was not being kept up with by the research and funding councils. Do you see that as a problem?

(*Professor Brook*) I think if you look at the causes you have to look at the potential sources for finance and one is the industrial sector and, as the previous group did tell you, in Sir Robert May's investigation of this he believes that support from the industrial sector is quite strong in the United Kingdom. I have to say that when we look at the support of the industrial sector across the different disciplines, there are some clear disappointments. Industrial support into the medical biological area is much stronger than it is into engineering, paradoxically. Therefore, when you say what are the causes of under-investment, one source you could perhaps imagine to use is a stronger level of involvement from the industrial sector on the engineering side.

(*Professor Radda*) I can perhaps add something different, that I think that universities, for a variety of reasons, some of which are related to the RAE, have tended to go for employing more people to do research. They had the option of whether they increased the manpower to do research or put that money into the infrastructure, and by and large, I think there has been a change in the volume of people doing research in universities as a result of their choice, and that includes PhD students. Many universities establish their own PhD studentships as well as their research fellowships, so that increased the number of people doing research at the expense of the same money being available for maintaining the infrastructure.

Mr Beard

339. Would that suggest that the problem is not so much a deficit as an imbalance in the way funds are allocated between capital for infrastructure and revenue for research support?

(*Professor Radda*) It could have been planned differently, yes, and it could have been planned in a more balanced way. There is, however, another component, certainly in the biomedical field, which is the enormous contribution from the charities for the research volume, and again that does not carry with it a great deal of support for the infrastructure.

Dr Jones

340. Many of the groups that you are funding will have tenured staff at the core of them, who are funded through the funding councils as opposed to the research councils. Is that important or not?

(*Professor Baker*) It is extremely important. It is vital to have that continuity of employment which allows people to build their research projects over a long period of time, so those people need, I think, to have that permanence to ensure quality and long-term research in universities that we fund. We fund, of course, many people on fixed-term contracts. It is not a weakness, it is a strength. It is a strength in that the turnover of that young staff in training and doing research maintains the vitality of the university system. So it works on a post-doctoral system.

341. We will be discussing that a little later but I have one more question on the research councils' funding. What proportion of alpha-rated projects are you actually funding and what has been the change?

(*Professor Baker*) It varies from council to council a little but I think all of us are funding something around 30 or less per cent. of our grant applications.

342. Is that alpha-rated or total?

(*Professor Baker*) Alpha-rated.

[Dr Jones *Cont*]

(*Professor Brook*) We have abandoned the idea of the unfunded alpha. You may remember this. This is where people have allocated alpha rating to a grant and then the finance was not there, so you send a letter to the person who is applying for it, saying: "This is unfunded but it was alpha grade," which lies behind your question. We became nervous about this because, of course, committees can use this as a euphemism for escaping from a decision. They have, after all, said that this grant is less satisfactory than some of the proposals above it. So we have tried to move to a notation where we say that there are grants which we can support and there are grants which we cannot support, they have come lower in the ranking. We can then answer a question which says, have we got grants which are unfunded which we believe to represent good work, and I would then say yes, we do have those but we do not use this terminology any more.

343. In that case, the proportion of applications that you would like to fund that you are not able to fund is around the 70 per cent. mark?

(*Dr Clark*) Less for us, 60 per cent.

(*Professor Brook*) I would say less.

344. But at least 50 per cent.?

(*Professor Brook*) Yes.

(*Professor Baker*) I think if we can substitute the words internationally-rated science for alpha-rated science, that would be helpful.

Dr Jones: I stand corrected.

Mr Turner

345. Dearing suggested yet another committee. He suggested that there should be an independent advisory council to monitor national science policy in order to make the Council for Science and Technology more effective; and the views of the councils differ, we understand. We would like to know why and we would also like to know how you feel about the operation of membership of the Council for Science and Technology? Do you think that could be altered or improved?

(*Professor Brook*) It is an entertaining question, in the following sense, that I believe the membership is not public knowledge.

(*Professor Radda*) We do not actually know who the members are.

Dr Jones: We have been trying to get the information and so far we have not been able to.

Mr Turner

346. So we are all in the dark there.

(*Professor Brook*) We know one or two people who are on it.

(*Professor Baker*) It might be difficult to recognise your comment that the councils differ in their opinions actually. My experience is that we do not differ greatly on that question, but we do believe that the Committee could be strengthened. Maybe if we knew the membership we would be clearer, but we would like to know a little bit more of what they discuss and would like to see the reports. We think that process, with a strong committee there, with a bit more publicity, would be helpful for a number of things which we have in our minds.

Dr Jones: I am sure this is something we can take up with the Minister.

Mr Turner

347. Would you think it beneficial if the membership of that Committee, if we knew it, had some international representation?

(*Professor Brook*) That is harder to say. I think it is important to know what is happening in other countries; it is important to know how their research support patterns are conducted, but it is very often difficult to move one pattern of thinking into your own national system and, therefore, one suspects that it is good to consult people outside on specific issues but I would be less sure that they would provide steady service as a constant member of such a grouping.

348. If there were a new advisory committee, do you think it should operate in public?

(*Professor Radda*) Yes. I think that openness is very important. Otherwise, what is the point having such a committee advising in secret.

349. Dare I ask you what you think of the effectiveness of the present Science and Technology Committee, which does not operate publicly and does not publish its membership?

(*Professor Radda*) We do not know what they do and we do not know what its effectiveness is.

350. Are you aware of its impact?

(*Professor Baker*) Of its existence?

351. Of its existence you are aware but are you aware of any effect it may or may not have?

(*Professor Baker*) No, we are not.

Dr Jones

352. What about the Science and Engineering Base Co-ordinating Committee? I think you know a bit more about that?

(*Professor Baker*) We do indeed.

353. How do you rate that?

(*Professor Radda*) It is a useful forum at which the funding councils and the research councils can compare notes, exchange information, discuss issues, and it is getting better as it goes on. I think we are learning to work with the funding councils and we begin to understand their way of thinking and I hope they understand our way of thinking.

354. So you feel it would be detrimental if that were in any way tampered with at this stage?

(*Professor Radda*) Yes.

Dr Kumar

355. You earlier on touched on the equipment and research infrastructure and you mentioned you recognise there is a problem in Sir Ron Dearing's suggested revolving loans fund. I certainly know from the Medical Research Council's submission

[Dr Kumar *Cont*]

that you consider the proposals unworkable. First of all, why do you think it is unworkable and then how do we solve that problem?

(*Professor Radda*) I think it is unworkable in the form in which it was proposed because charities and research councils and industry are expected to put in funds and not know what it is going to support. As far as the research councils are concerned, and I am sure our colleagues in the charities will say the same, we have to account in scientific terms and the quality of the work for where our support goes. That will not be possible in that scheme as it is and we would not even know that it is going for medical research. It could be a loan for something else. Therefore, we do not think it is workable from our point of view. What can you do instead? I think there are a number of ways of dealing with the equipment issue and I think all the research councils between them and HEFCE are trying to tackle it. In our own way we have re-organised our funding modes to be able to work more closely together with universities and, therefore, identify where there is real need in boosting up the infrastructure, the equipment and so on, and we would do it as part of our normal funding within what we could afford. I think the Joint Research Equipment Initiative between HEFCE and us has gone a little way—not enough but a little way—to make up this equipment shortage and I think we could expand both of those if there were the funds available, but not on the loan basis, from people who do not wonder where their funding goes.

356. So you see the Joint Research Equipment Initiative as having a long-term future, do you?

(*Professor Radda*) That certainly has a future and so far, on the two or three occasions we have had it, it has worked pretty well.

357. Do you agree with Sir Ron that there is a shortfall of £400-500 million? Would you agree with that?

(*Professor Radda*) It is extremely difficult to estimate that shortfall and those figures are bandied around and it is hard to know how they were arrived at. We have tried to do a case-by-øcase assessment of where there is a need in the groups or in the departments where we are supporting work and that is a more accurate way of assessing it, and then we try and plug the gap.

358. What do you think the figure is?

(*Professor Radda*) I do not know what the figure is, is the real answer. What I can tell you is that if we work on the assumption that the difference between full funding of the research and funding with the present overheads is an issue and that represents the funding gap, then for the MRC that gap is about £25 million, but that is assuming the funding gap is equal to the present overhead we support and what you might regard as full support.

(*Professor Baker*) Our figure was £10-20 million and I think I should couple that with the comment that our funding of projects is normally accompanied with a request to fund certain equipment. We see a deficiency in our ability to be able to fund that equipment which is requested alongside the proposal, so the proposal may well be rated highly and we would like to fund it but we know that the individuals are then suffering somewhat with equipment that is dated and perhaps not state-of-the-art in the way that we would wish it to be.

(*Professor Radda*) Perhaps I could add that we spend about £15.5 million each year on equipment, capital equipment, in universities, of which about half is in units, but the majority of our units are embedded in the university departments and the department, therefore, actually benefits from the equipment that we give to our own units.

(*Professor Baker*) Our committees face a dilemma, if I can add further to George's comment. The dilemma is, do they fund the people, the individuals, and they are then constantly looking to save money by not funding the proposal properly to enable sometimes individuals to do it quite as well as they might do, therefore the work takes longer if the equipment is not right, and that in some way brings inefficiency into the system.

Dr Jones

359. Professor Brook, would you like to comment?

(*Professor Brook*) The calculation, as I understand it, does make assumptions about how many universities you would wish to have and how many departments of research in these different disciplines you would wish to have and, therefore, these assumptions become rapidly tied in with particular pictures of how the university system should develop and, therefore, I am loath to give a simple answer. The picture we try to ensure is that those research teams which we can support, the individuals who come to us with proposals, it is, as I would agree with my colleagues, crucial that they have state-of-the-art equipment so that the work can be prosecuted at the correct level, but this wider figure which has been developed has behind it this wider picture of how the university system should be, and the research councils should be hesitant, I think, about speaking too strongly.

Dr Kumar: So we cannot persuade you to come out and say—

Dr Jones: Can we move on to the question of indirect costs then. Mr Beard?

Mr Beard

360. Is not the way of arriving at indirect cost estimates by taking a percentage of staff costs a rather crude way of doing it, and moving to a more determined way of identifying a route, would the benefits of getting that more defined picture outweigh the administrative and management costs involved in that?

(*Professor Radda*) We certainly wish to encourage universities—and our new funding schemes again are designed to do that—to give us some proper estimates of the actual cost of the research that we wish to support, and that includes the other components. I think transparency of that costing is a critical part of the way we can have partnerships with our university colleagues.

(*Dr Clark*) I wonder if I can contribute to that because I was very closely associated with the dual support transfer that took place in 1991. As you

[**Mr Beard** *Cont*]

probably know, Lord Phillips, then Chairman of ABRC, was the mastermind behind that. There were two valid reasons for arguing for a transfer from the funding councils to the research councils at that time: (a) to make university researchers more aware of the true cost of the research they were doing at the time, and (b) to clarify the boundary to stop horse-trading between the universities and research councils across that boundary. You had the situation where a university would come and bid for a bit of equipment and the research council would say, "We will fund 50 per cent." and so forth. So they would say to the research council, "If you like this bit of research you must pick up the direct costs." Certainly Lord Phillips' approach was to put as much as possible on to what was called the direct costs, the buying of the equipment, the travel, the technician and so forth, so that the researchers were fully aware of that. Then there were a number of other things which were people-related, where quite honestly the simplest way to do it would be as a percentage of the people costs and that was things like the libraries, like recruitment costs, where really we would be back to penny accounting to fully account for that. The figure of 40 per cent. that was agreed, then upgraded to 45 per cent., was not deemed to be a full overhead. That was a figure advised by the CVCP on behalf of the universities as a contribution to the overheads and nobody would claim that 45 per cent. is the full overhead, but it was a recognition that the research councils should take account of all direct costs and then contribute to the overhead. Sir Ron Dearing has come up with a figure of somewhere between 60 and 100 per cent. Of course, you could go to individual universities, as happens in the United States, where the National Science Foundation actually agrees university-by-university an appropriate overhead rate. But I think that that would clearly take more effort on behalf of the universities and on behalf of the funders and I think at some point you have to say, "Let us agree an appropriate level, what seems right." At the moment 45 per cent. is not the whole overhead, it is just a contribution which the universities themselves suggested.

(*Professor Baker*) It is almost an impossibility, I think, to calculate the overhead with the dual funding system impulse, and all of us support the dual funding system. If there were not, then you could accurately work out, as an industrial company does, what its overhead costs are and put it in. In the case of the dual funding system we have had, then it is in the hands of the universities to a large extent to determine what volume of research they do and they have expanded the volume of research by funding students and other people to do research with no support costs whatsoever. Of course, the European Union only contributes 20 per cent.; the charities do not contribute, but it does depend on where the university wants to spend its money. It can employ technicians and that is an overhead, that is a support cost. So it is a very complicated way to go forward and I for one do not believe that the universities are capable. I think they could make the calculation if they spend an enormous amount of money to work out accurately what figures can be allocated to each particular research project which they do, but I think they could be asked to examine very carefully the degree of their activities and the spectrum of activities which they follow which could allow rather more funding for those selected areas which they wish to prosecute strongly.

361. So the general feeling is that you do not believe universities should go into a more elaborate exercise to identify the indirect costs of each project?

(*Professor Baker*) I am dubious about advising universities to do that.

362. If you upped this magic 45 per cent. to, say, 60 per cent. would that take away some of the problem that arises?

(*Professor Baker*) It would decrease the volume of research that we fund. If we in biological sciences believe that we should grow that amount to underpin the economy in pharmaceuticals, in food and agriculture, then I think that would be a loss and the development of wealth in this country could be affected if that volume were decreased.

363. Is there a difference between different disciplines in this problem of infrastructure that the Dearing Report has identified?

(*Professor Radda*) I am sure there is and I expect on your side probably it is worse than in the biosciences and the biomedical field, where clearly we do have contributions from other organisations in this area, and I think by and large the equipment shortage in our best teams is not as bad as it is perhaps in chemistry departments.

(*Dr Clark*) Clearly it is discipline-dependent because in subjects like computer science or mathematics you do not require laboratories and need less money than with something like chemistry. The question was asked earlier, what have been the causes of under-investment in universities, and certainly in chemistry labs tighter controls on health and safety is a factor, and perhaps also the expansion and major investment in the sixties and seventies. A lot of chemistry labs now would not be deemed properly safe and so vice chancellors have had a problem with how to refurbish major laboratories.

(*Professor Brook*) But research itself becomes more expensive. Equipment becomes more advanced and it costs more.

364. That is the general case?

(*Professor Brook*) That is right.

365. But there is a disparity between the sort of figure you were quoting as the difference between what is now provided and what you would have to provide to fully fund the infrastructure behind the projects you fund; and I think the Medical Research Council and the Biological Sciences Research Council are running up to about £35 million, from what I heard? That is a wide gap from what Dearing has estimated.

(*Professor Baker*) Dearing estimated £110 million for all research councils.

(*Dr Clark*) For all research councils, yes.

(*Professor Baker*) I think our figures are probably consistent with that.

366. I just wondered whether the implication was that the concentration of this disparity was in the engineering and physical sciences side?

(*Professor Brook*) Our estimate is £50 million.

(*Dr Clark*) About £50 million going to the 100 per cent. range of overhead.

Dr Jones

367. I think Dearing says £110 million for the research councils but £475 million equipment backlog through the HEFC. Are you—I was going to say reasonably happy with those figures but I rather gathered from what you said earlier that you are not?

(*Professor Brook*) The 110 we can calculate. That is straightforward, just to go from 45 to 60 or whatever you imagine it would be. The one about the £450 million, that starts to make assumptions about your vision of the university sector, in short.

368. But you do accept that there is an upgrading, that new equipment is needed?

(*Professor Baker*) Yes, but I think we should not confuse overheads and equipment. Professor Radda and I answered the question about equipment efficiencies. Overheads, of course, are supporting the work that goes in. The two are not the same. Equipment is clearly an overhead but the cost of running the research, of reagents, of animals and everything else that goes in, is an overhead, and that is the £110 million that we have talked about.

369. I rather gather that you are not proposing that money should go from the funding councils to the research councils to increase the overheads from 45 per cent. to 60 per cent., or are you? and how would you react to the resistance of the funding councils to this?

(*Professor Brook*) I can report that what the Council of the EPSRC decided was that it seems appropriate that the research councils should provide the correct overhead for the work which they support. It has a logic to it which is compelling, but in terms of the source of that finance, if that could be new money to allow that to take place, that would be reasonable, otherwise the Council saw more disadvantages in alternative schemes than in leaving the system as it is. If we were to move the money from the funding councils, for example, the query would then arise that if we pay full overhead, is there a risk that we start to invite other than universities to come and get the finance. At the moment, if you think about independent research organisations, they find research council funds not so attractive because the overhead at 45 per cent. is less than a realistic one. If we start to pay a genuine overhead, do they come in as rivals?

370. Would that be a bad or a good thing?

(*Professor Brook*) It would be much disliked by the university sector.

371. That is not the answer to the question!

(*Professor Brook*) I think the answer to your question is that the Office of Science and Technology has, I think quite correctly, identified sectors of research council-supported work where it is appropriate to have participants outside the university sector and sectors of work where only universities should be allowed to participate. With basic research, for example, with a strong training element, you would like the universities to be in control and the dominant figures there, but if it is for a piece of work, you want a specific piece of equipment built or something of that kind, then it is quite possible that someone outside the university sector would have something to offer.

372. Would any of your colleagues like to comment?

(*Professor Baker*) I think my Council would agree more or less with that and it would have the view that our problems would not be solved by such a simple transfer. I think for our own purposes it would be easier for us to run our portfolio of research by giving a higher volume of indirect costs, support costs, but we feel that the knock-on effect by the loss of the funding councils may well be counterproductive.

373. What influence does a department's rating under the Research Assessment Exercise have on the allocation of research council funding and how are the RAE and the research councils' selection processes linked?

(*Professor Radda*) We do not support departments. We support teams with a programme of research that is internationally competitive and that is our judgment. Whatever the department's rating is, it is not relevant. We do look at the environment in which we are putting that research support. We certainly want to know if there are intellectually stimulating people around, whether the infrastructure is properly supported and so on, but we select teams. The second point is that people get high ratings in their RAE because of the five-year support previously by the research councils to that department. So the interaction is the other way; it is the RAE that reflects the success of the research that is being done, largely on the basis of research council support.

374. We have been told that. Do you think that is a reason for abandoning the RAE and just following the research councils' allocation of money?

(*Professor Radda*) The RAE had a beneficial effect in the sense that universities had to start thinking about some sort of research strategy, some sort of planning and a bit of accountability. I am sure that the RAE as it was practised on the last two occasions can be improved and HEFCE realises that and I think they have now sent out a consultation paper and we will have a significant input into that for making sure the next exercise is different.

(*Professor Baker*) I think it is clear that the RAE has catalysed a change for selectivity in the United Kingdom universities in a real way that I believe will benefit. For our part, although we do not, of course, direct our grants based on an RAE score, then 80 per cent. of our funding is currently going into four and five rated departments. So the two processes do seem to follow each other and I think that has some certain satisfaction.

Mr Beard

375. Are they entirely independent?

(*Professor Baker*) They are entirely independent, of course, because, although some of us did sit on the RAE, our process is a peer review process for individual proposals. We fund, we buy, research and, therefore, we look at proposals before the work is done and examine whether that is within the remit and mission of our Council and is in the strategic direction which our user community wishes us to be since they have a major influence on the way we fund.

[**Mr Beard** *Cont*]

(*Professor Brook*) If I may, I think there is an important point of difference between the two. It has been recognised that the RAE is retrospective, that each time it looks back over research produced over the previous three years, and it is done itself every three years, so it can at certain points be looking back six years, whereas the research councils look forward in the light of proposals which have been received. So it does seem reasonable that the RAE should use research council allocations in making its assessment but it would be unfortunate if you closed the loop by having the research councils slavishly follow the RAE in making their allocations. I think the distinction is important in the light of a paradox which has arisen in the Dearing Report, the statement that the research councils are somehow less effective in supporting genuinely innovative work or very refreshing work, where they are perhaps less effective in dealing with younger colleagues and so on. I think there is an argument, after all, that since we look forward on the basis of a proposal rather than back six years, we can in some ways be seen as, shall I say just at least equally accessible to the young and to the imaginative.

Dr Jones

376. I am glad you raised that, because certainly the MRC at least is now concentrating its funding in relatively few, as it describes them, well-resourced individuals, teams and centres. Is that not going to militate against perhaps an inexperienced young researcher with new ideas but no track record? We are moving towards greater selectivity, and maybe if it is not a criticism now, is it going to be more so in the future?

(*Professor Radda*) No. I think that statement must be considered in the light of all the changes in the MRC funds. First of all, we have a substantial amount of money, over £30 million a year, on training programmes where we select the individual we want, and fellowship programmes and senior fellowship programmes all the way up to professorships. So we actually pick out the best individuals, wherever they are in that scheme. Secondly, we have a special scheme for newly-appointed university lecturers which is not in competition with all the other funds. We have earmarked ring-fenced funds in an annual competition for newly-appointed lecturers, wherever they are. Thirdly, we have a particular scheme for innovative work. Again, wherever it is done it is funded as a ring-fenced competition. So I think that the statement that we are trying to build up funding in a way that you can actually share infrastructure and that there is a critical mass is certainly correct, but that does not work against either the young—in fact, we have special schemes for the young—or the innovative or, for that matter, the universities which have not yet got a critical mass, because we have special schemes for developing these. We have development funds for universities who want to build up that sort of critical mass.

377. And are these funds top-sliced from your generality? We were discussing earlier how only between 30 and 50 per cent. of projects that are of international standard are actually funded. These other schemes that you are referring to, would you put those in the same classification?

(*Professor Radda*) The fellowship schemes are separate from the grant competition. The young researchers awards are separate from the other grant competition, although they compete against one another, and the innovation grants are taken out. All the other funding that we have is in open competition for whatever is the best proposal.

378. And what proportion of your funding comes into those categories?

(*Mr Winterton*) I would say just over 10 per cent. goes into the training schemes, and that includes the fellowship programmes; I would think about 5 per cent. at the most goes into the special schemes, so it is about 85 per cent. that goes into the open competition where everyone, as it were, is competing, our own units and university teams alike.

379. But does that make up for the loss of shorter-term, three-year project funding in terms of starting people off, or is it just that you recognise there is a problem so you allocate a dollop of money but it is really not going to solve the problem?

(*Professor Radda*) We have not in a sense abolished the project grants in the way you say. We still have short-term funding and what are doing is saying to people, "In order for us to be able to help you with the infrastructure support as well, it would be to your advantage if those of you who want to do individual projects get together and say how they can benefit from putting in a proposal which has independent components but also something common in the way of infrastructure."

380. The HEFC have set up their own special scheme on collaborative research which is encouraging researchers perhaps from lower rated teams, as you put them, to collaborate with other groups. Do you support that sort of approach?

(*Professor Radda*) I think we have to support the best and that is an absolute criterion.

381. And the best can sometimes be in departments that are not highly rated?

(*Professor Radda*) Indeed, and we have schemes that perfectly allow us to do that. The only thing we are saying is that very often we would prefer to give you five-year support than three-year support, and the five-year programmes are not tied to being in large teams or anywhere; they can be in any university. If it is a good programme, it is going to be supported if it is competitive.

382. You have reacted quite strongly against a suggestion that you should reduce the volume of projects but is there any alternative if there is not going to be a substantial increase in public funding?

(*Professor Radda*) No, there is not an alternative if you are going to pay for the full cost of the research.

383. So you would argue that the only long-term solution is for a substantial increase in public spending?

(*Professor Radda*) I think perhaps we should say even more than that. I do believe—and I am sure our colleagues in other research councils can argue—in the biomedical field the opportunities are enormous. If you think about all the new things that it will be

[**Dr Jones** *Cont*]

possible to do once the human genome has been sequenced, unless we are actually able to put more funds into that, we are not going to remain competitive.

384. Would any other gentleman like to comment?

(*Professor Baker*) I commented earlier that the growth in biotechnology, the position of biological sciences now, which many of us believe is at the most exciting time ever in history, presents opportunities, I think, to the benefit of the United Kingdom and the failure to support that will cause a negative effect rather than a positive one.

(*Professor Brook*) I think a similar thing. We can each point to subject areas which we believe to be particularly fruitful over the next decades. From the Engineering and Physical Sciences Council we would look very much to information technology and the engineering disciplines that are associated with it; we would look very much to mathematics, which we see as being a crucial discipline spreading out across all research council activity. So we would share the view that the sustenance of the really imaginative people working in those subject areas is one of the best investments that can be made by the nation over the coming years, and it is a pity if that gets caught in some detailed procedural arrangements about moving money from here to there or something of that kind. If that is used to conceal the fact that the total is rather less than strategically you would wish it to be, then it would be unfortunate.

385. Would you like to put any figure on the amount that you would be calling for? A little earlier you were reticent about some of the Dearing figures.

(*Professor Baker*) I can give you a figure for our Council, if I may, with a smile on my face, but I would have thought we would be delighted with £25 million, we would have been over the moon with £50 million.

(*Professor Brook*) I think the Dearing Committee has given us a great deal of help. It has pointed out that a move to correct overhead is right, so I think the £110 million global is not so bad. Our part in that is £50 million and then that does at least ensure that the research which is there and selected at the moment can be put into action with full effect.

Dr Jones: We are going to change the subject completely now. Mr Turner?

Mr Turner

386. Absolutely. Dearing recommends an Arts and Humanities Research Council. We would like to know how you feel about that, especially about its funding if there is no new money to fund it?

(*Professor Brook*) We have one of the arts within our Council, of course, in that mathematics is very often placed within arts faculties in the university sector. These are colleagues who tend to work in offices and in libraries and they think and then they go and meet with one another, so their sociological behaviour (if I can put it that way) is very similar to that of people working in the arts. We have no embarrassment in funding such colleagues. Indeed, we have ways which are admittedly different from the ways we use for engineers, but there is no difficulty in including them within the research council system. I must say that speaking personally the idea of an Arts and Humanities Research Council is not something that strikes me with horror. Other countries work quite happily here, particularly those countries which use single research council systems. The German Deutscht Forschungsgemeinschaft puts all disciplines in one box and it works. Now finance proposals have been made, and if it is somebody else's money I feel again somewhat restricted in saying how it should be done.

Mr Turner: I do not think he was offering it.

(*Professor Brook*) No, I was looking further than my colleagues.

Mr Beard

387. The career structure for young researchers and students is a fairly unstable programme for the short-term funding of contracts. I wonder whether this inhibits people who might otherwise take up these opportunities from joining in and whether this sort of arrangement is a good enough training ground for people who are going into industry, given that sort of instability?

(*Professor Baker*) I have always been slightly curious about this case. Our universities are training areas and we do research in universities predominantly for training but, of course, then there is the innovation which flows from it. It is my own belief that the post-doctoral individual is well advised to do at least one contract and maybe to do two, but I cannot see the reason why he would want to continue for four, five or six years in universities when there is so much excitement out there in the economy which he is trained for. So I do not totally subscribe to your concern, although there are, I think, difficulties in universities in which they are forced to employ some people for long-term support on temporary contracts, and I think that we ought to examine these positions very carefully, but for those other researchers, people who progress through into post-doctoral work from postgraduate studies, then there is a limited time I would advise as the optimum period.

(*Professor Brook*) Perhaps my colleague could speak about the transfer schemes.

(*Dr Clark*) Just very quickly, I think that contract researchers in universities are essentially used for three purposes: one is pairs of hands to get the research done, and certainly the people who hold the grants tend to look on their contract researchers as the people who get the research done; secondly, as a stepping-stone to academia, where some people go on to an academic position at the end of their contract appointment, although certainly in our area fewer than 20 per cent. of contract researchers can hope to do that. But the third reason actually is as a means of technology transfer, taking people, schooling them in a particular area, developing research leadership skills and then taking them out into industry or commerce or elsewhere, and certainly that is technology transfer on the hoof. Taking contract researchers and moving them out into companies is something which in our area is particularly important. We have just started funding contract researchers on three-year grants for a fourth

[**Mr Beard** *Cont*]

year especially to move out into a collaborating company, so that at the end of the fourth year they are actually out in the company. But there is no obligation on the individual to stay with the company and no obligation on the company to actually keep them. But at least then they are outside the academic system and have at least a years' industrial experience. So it is recognising the technology transfer potential of contract researchers in universities and getting them out into companies, as Ray says, into the exciting things that are going on in companies.

(*Professor Radda*) I think we are all tackling this issue quite actively and perhaps differently in different structures. Within the MRC, of course, we have a very well worked out career structure for scientists, for support staff and technicians and so on within our own MRC units and institutes, which is half of our budget. On the other half of our budget we have developed funding schemes that will allow the universities to plan a better career for their own researchers that we would support under grants. That is very important and that does not necessarily mean staying in the same place, as Ray Baker has pointed out. In fact, they are encouraging them to move and enable that sort of movement and come up with schemes that make that possible.

388. But you do not think these present arrangements—the short-term nature and the uncertainty of whether people get another grant or not—are inhibiting people who would be useful in this research field from going in?

(*Professor Brook*) I have not seen it that way. The one point where you do have to be careful is that occasionally people are induced to stay longer in a short-term appointment than is correct for their own career development. Maybe they are excellent with a piece of equipment or something of that kind and there is a temptation for the research leader to keep this person because they have the necessary skills when really the best advice would be to say, "You are now trained. Please go."

Dr Jones

389. Does that mean the actual research might lose out as a result of people moving on sometimes?

(*Professor Brook*) No, I think transfer of that kind is to be welcomed. If they go out of the country you would have to say we hope they come back later. That may be sad, but if they go out into the industrial sector or move to another university into an academic post, that is for the good of all of us really.

(*Professor Baker*) Because the principal investigators stay in the university system. They are the leaders, they drive the research forward and so they stay there permanently.

390. I think we have come to the end of our questions but if there are any points that you would like to make you are very welcome to do so.

(*Professor Baker*) No, I do not think so.

Dr Jones: Thank you very much. I am sorry our numbers were somewhat depleted. We have had a very interesting session and a somewhat slightly different perspective from what we have had previously. Thank you very much.

WEDNESDAY 17 DECEMBER 1997

Members present:

Mr Nigel Beard
Dr Ian Gibson
Dr Ashok Kumar
Dr Lynne Jones
Mr Nigel Jones
Mrs Caroline Spelman
Dr Desmond Turner

(In the absence of the Chairman, Dr Lynne Jones was called to the Chair)

Memorandum submitted by the Association of Medical Research Charities

1. THE ASSOCIATION OF MEDICAL RESEARCH CHARITIES

1.1 The Association of Medical Research Charities (AMRC) itself does not fund research but represents 99 *registered* charities which have as a principal activity the support of medical research in the UK. In 1996–97 these charities spent £420 million which represents approximately 90 per cent of all registered charity expenditure on medical research. Of this total, 48 per cent is accounted for by the Wellcome Trust. Details of member organisations are included in the enclosed Handbook.

2. MEDICAL RESEARCH CHARITY SECTOR

2.1 The contribution of AMRC member organisations has tripled from £138 million in 1987–88 to £420 million in 1996–97.

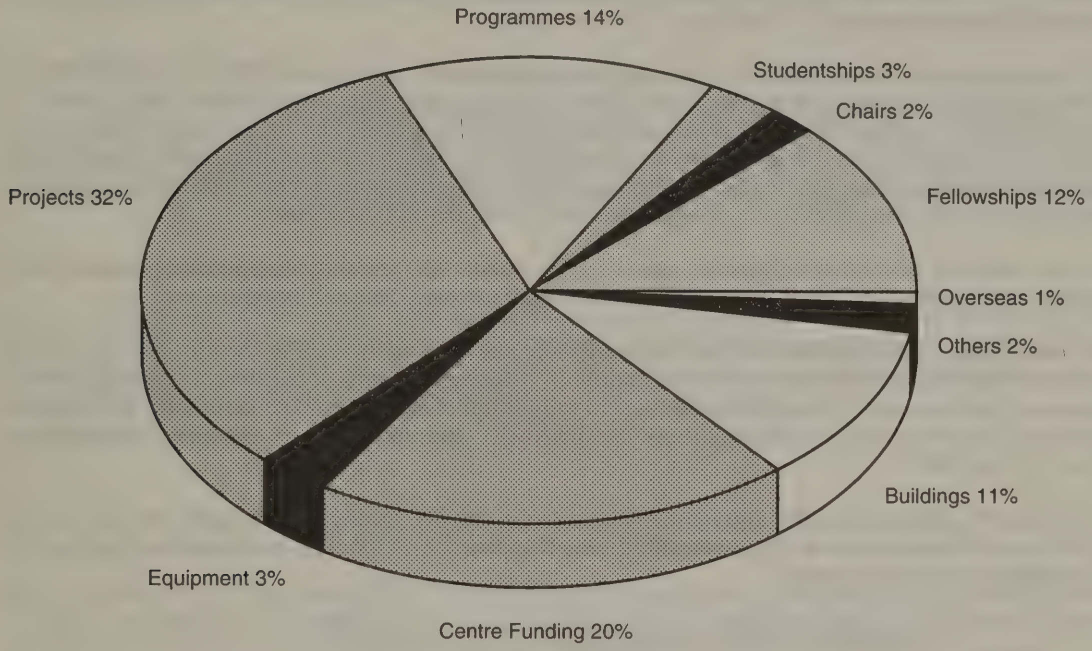
2.2 The university sector is the principal beneficiary of charity funding for medical research and accounts for over 70 per cent of funding. This reflects the fact that universities undertake a very wide range of research activities relevant to medicine and are able to attract funding from charities for almost every field of research. In contrast the research councils receive around 1 per cent.

2.3 The charity sector in medical research is characterised by the fact that much of the funding is available for disease specific research. The AMRC cannot categorise charity funding under the three headings suggested for consideration by the Committee of inquiry: basic, strategic or applied.

2.4 The chart below gives an analysis of charity funding by *purpose* for 1996–97: the most prominent features are that a significant proportion of charity funding for medical research is in the field of cancer (29.72 per cent) and the largest area is general medical research with 49.74 per cent (largely represented by the Wellcome Trust but including a number of other smaller charities). Charities fund a range of research relevant to their disease: some research is basic, some strategic and some applied.

2.5 The charity sector, at least in part, reflects the public's priorities in medical research. It is the principal or major source of funding for medical research in a wide range of areas including cancer, ophthalmology, cystic fibrosis, diabetes, psychiatry and heart disease. It is important therefore that the contribution of the charity sector is viewed as part of the whole picture of UK medical research, that the different roles are mutually understood and that we work for partnership and complementarity.

AMRC Charities - Expenditure by type of grant 1995



2.6 Charities support research through a very wide range of funding schemes. There are broadly three types of support: responsive funding (eg programme grants, projects, fellowships etc.), partnership support for longer term research initiatives (buildings, core funding, units, named departments) and research supported in charities' own institutes (eg ICRF and Marie Curie). For smaller charities, research funding is predominantly in the form of project grants.

3. The Purpose of the Medical Research Charity Sector

3.1 The purpose of the medical research charity sector is to support research which will improve our understanding of human health with the aim of curing, alleviating or preventing human disease. They do not exist principally to support the UK science base or the higher education sector.

4. Public Benefit

4.1 Medical research charities do not support research for commercial or private gain but for public benefit.

4.2 The UK benefits from having a strong charity sector in medical research. The charities support approximately one third of UK medical research (or 13 per cent of total R & D) and this level of funding is unparalleled elsewhere in the world and nor is it found in other areas of science.

4.3 It is not only the institutions which receive the funding that benefit: the public and the NHS benefit in improved understanding of disease and in the development of training and skills.

4.4 The UK also has a strong pharmaceutical industry, the success of which is linked to the breadth and strength of life sciences in UK universities which is, in turn, due in part to the contribution of the charity sector.

4.5 One of the principal aims of the UK Government policy in funding life sciences research should be to make the best use of the resources available. Government policy should therefore recognise that the Treasury cannot fund all the research that is necessary or timely and should therefore not focus exclusively on its own funding mechanisms and own priorities but should consider also the needs and contribution of the charity sector (which many consider to be the "wider public sector") and industry in order to assist all sectors to meet their objectives.

5. Charity Funding in Universities

5.1 The charity sector is currently a major source of external funding for university life sciences research. In 1990–91, 58.5 per cent of AMRC charities' funding went to universities and medical schools. The percentage has now increased to 74 per cent.

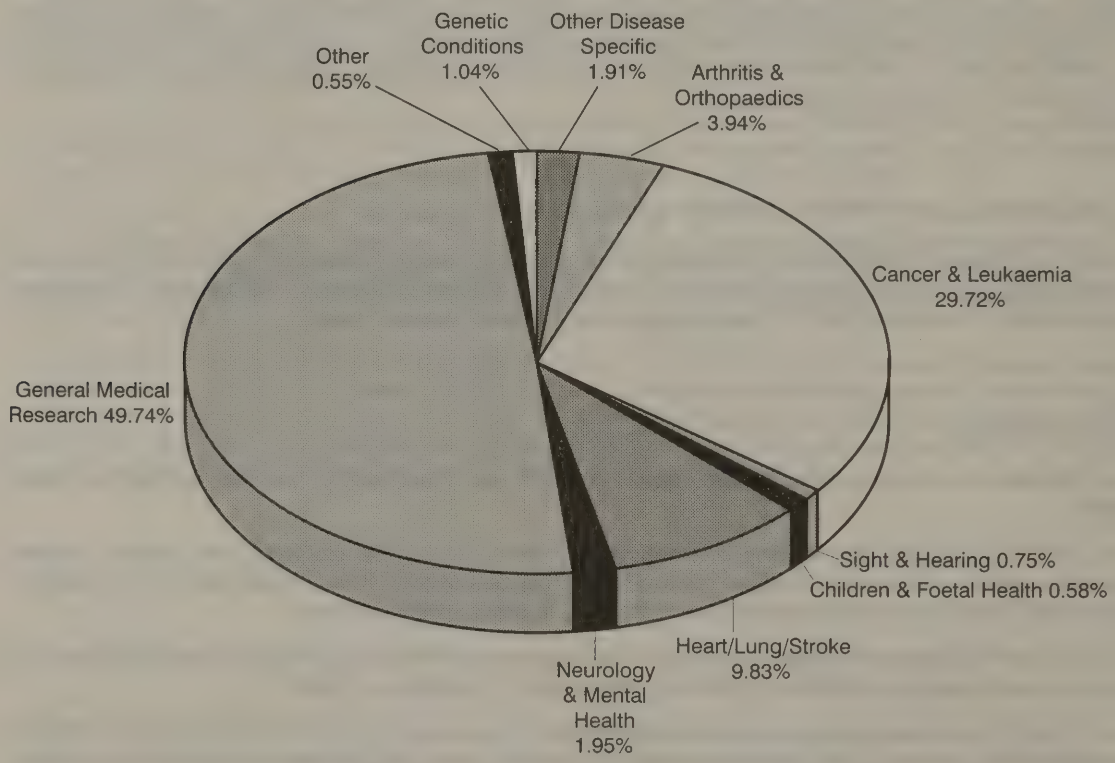
5.2 But the balance in the **type** of funding has changed markedly: whereas in 1990–91, 47 per cent of research funding from charities was in the form of short term project grants, this has now fallen to only 32 per cent. (In 1990–91, 69 per cent of all grants awarded were project grants. This figure now averages 52 per cent). There has been considerable growth in other types of support which are more often undertaken in close partnership with universities: funding for research centres, programme support, buildings, resource funding (eg family databases, tissue banks), major equipment and career development grants.

5.3 The AMRC believes that universities must be able to undertake research in responsive mode in order to develop original ideas and provide the seed-corn for more extensive research programmes.

5.4 Universities report that over the last ten years there has been an increase in the number of research workers in universities employed on short term contracts. Although an increase in external research funding may account for this in part, it must be noted that the proportion of charity short term funding has reduced: for example, the number of project grants supported by AMRC charities has decreased since 1990–91 from 1,843 to 1,294 in 1995.

5.5 During the same period the average annual cost of a project grant has increased from £30,270 to £41,752: a rate of increase which is considerably higher than the rate of inflation and much higher than the salaries inflation in the same period.

AMRC Charities: Funding by purpose for 1996/97



5.6 Where charities are able to identify longer term and wider programmes of ongoing research, different types of funding schemes are available including programme grants, support for units or named departments, chairs and rolling senior personal support, new buildings or major items of equipment.

5.7 Although this longer term funding, developed in partnership with the university, can assist institutions with their wider research interests and strategy, for the charity it is important that the research continues to be relevant to their disease interests and within their objects.

5.8 The AMRC sees the funding of research in universities as a partnership between the higher education and charity sectors.

5.9 Universities play a crucial part in bringing together the various funders of medical research: NHS, Department of Health, industry, research councils, funding councils and charities.

6. High Quality

6.1 Members of the Association of Medical Research Charities believe that peer review is essential in order to ensure the quality of the work being funded and to maintain distance between those who disburse funds and those who receive them. It is a condition of membership of AMRC that a strict process of peer review is used for all awards and the operation of this process is monitored regularly by the AMRC.

7. Regional Characteristics

7.1 The structure of the charity sector in medical research is also affected by regional factors. Although the majority of medical research charities are national and will support good quality research wherever it may occur, there are a significant number of charities which are restricted in their activities to particular geographical areas or even individual institutions.

11 December 1997

Examination of Witnesses

Mr Fergus Logan, Chairman, AMRC; Chief Executive Designate, Arthritis and Rheumatism Council, Dr Trevor Hince, Executive Council, AMRC; Director, Scientific Department Cancer Research Campaign, Sir Leslie Turnberg, Scientific Adviser, AMRC and Ms Diana Garnham, General Secretary, Association of Medical Research Charities, were examined.

Dr Jones

391. Mr Logan and colleagues, could I welcome you to this session of the Science and Technology Select Committee. We look forward to hearing your evidence. I suggest, because we have got a lot of evidence to take today, that we go straight into the questions and at the end, if there are any points you would like to make that you feel have not been covered then I would be very happy to give you time to do so. Therefore, could I start with the first question? We have heard that the funding councils give additional funding to those universities that get money from medical charities. What would be the effect if that funding were to be withdrawn?

(*Mr Logan*) That funding—and I will ask my colleague, Sir Leslie Turnberg, to deal with this in more detail in a moment—is based upon the quality of the work which is done because all of the support that is received from AMRC Medical Research Charities is as a result of a very stringent peer review process, so effectively that funding is a reward for excellence. Certainly we would wish to see excellence continue to be rewarded. I do not know if you wish to add anything to that, Sir Leslie?

(*Sir Leslie Turnberg*) I think you are referring to the indirect costs of the research that the universities fund themselves?

392. Yes?

(*Sir Leslie Turnberg*) The effect of a withdrawal of that element of the funding would be to minimise the capacity for universities to undertake research. The alternative is to find another source for that funding. If it were to come from research charities that would immediately reduce the volume of research that could be done.

393. Are you not concerned that because of this, and since most of the charitable funding that is available to universities is certainly in the medical fields, this is actually biasing the research within universities into the medical areas?

(*Dr Hince*) Perhaps I could make one comment in respect of that. Biomedical research is an area in which this country is particularly strong, also it is an area of research which impacts directly on the lives and the population of this country. I think it is not for the Medical Research Charities to have as their concern the effect that has on the overall university research. We have a constituency, if you like, of the general public, many of whom suffer from major illnesses who choose to give us money for us to spend on research.

394. Another concern that we have heard is that, particularly for the smaller charities that are members of your organisation, they will often give funding perhaps to support an individual in a small group and then that funding dries up leaving the universities with, if you like, pieces to pick up, possibly to continue funding an individual. Do you perceive that as a problem and do you think there could be changes that might help to ensure that improvements are made to the system?

(*Ms Garnham*) Most of the charities in the AMRC are quite small, spending less than £500,000 a year. There is very little evidence that they are not getting bigger, most of them gradually get larger so the source of money does not dry up. What happens is that they tend to allocate the money on a short term basis, say two or three years, because that is the best option for them given the insecurity of their own funding and the fact that they are not secure enough in the sources of funding to make a longer term

[**Dr Jones** *Cont*]

commitment to a university. Most of them if they are funding individuals will do it on the basis of perhaps two or three years with the university taking up the appointment after that. Other than that, most of them will fund projects in which case they are responding to a short term identified piece of science that the university researcher wants to do and that is time limited.

395. You would contest that there would be withdrawal of funding to a project because of funding difficulties on the part of the charities and that any withdrawal is purely because it is decided that the money will be better spent elsewhere?

(*Ms Garnham*) Yes, well I can think of just a handful of examples where charities have encountered funding difficulties during the course of the grant. In fact the AMRC's advice to them was that they should set the money aside that they have committed and if they are very small they should not commit money that they still have to fundraise. I think our member charities are quite professional about the way they do that.

396. This is something your organisation has discussed and looked at?

(*Mr Logan*) Yes.

(*Sir Leslie Turnberg*) Can I comment that although the majority of the charities which are members of the AMRC are small and support short term projects which are applied for specifically by researchers in the university system and they specifically want these projects—two or three year projects—undertaken. The majority of the money which goes through the AMRC charities in fact goes through a relatively small number of very big charities and they are very cognisant of the need to support universities in longer term ways and indeed support chairs, senior fellowships and so on.

397. We will be speaking to Wellcome soon. Any other comments you would like to make?

(*Ms Garnham*) I would like to come in. One of the things that our data shows is that most of the money going to universities is in the form of project grants and the evidence seems to be that is what universities ask for. We have three initiatives in the AMRC where we are looking at different ways in which smaller charities might collaborate in funding research. That is very dependent on universities coming to the charity sector with research strategies that people can buy into in a different way but if universities ask for project grants that is principally what charities will tend to give them.

398. What is the mechanism for you discussing such issues with universities?

(*Ms Garnham*) For example getting universities to come up with a research strategy. We have offered this to a number of universities where our data showed that 70 or 80 per cent of the money was project grants. I have written to them and said: "Our data shows this, the national pattern shows only about 30 to 40 per cent in project grants; there is an imbalance in your institution; would you like to discuss it with the charities and talk about the ways in which we might collaborate". That is particularly important where they have local sources of funding where the money tends to still come through to universities in project grants but it can only be spent in that institution so obviously there is an opportunity to change.

Dr Gibson

399. Have there been any cases where universities have turned the offer down of a project grant because they are looking down the line and saying: "We cannot possibly take it on and keep it going"?

(*Ms Garnham*) We have not yet heard of one.

400. Does that surprise you? Of course it does not, does it, because as a researcher you are forced to take that? Can you see any other ways to handle that situation?

(*Ms Garnham*) If universities felt they could not afford to take the money?

401. Yes, they cannot say no. How can you help them be confident that work is going to go on because project grants never go in my experience past two lots, three years plus two, six years if you are very lucky. Everybody knows that, it is an unwritten law.

(*Sir Leslie Turnberg*) Universities know what they are doing. Usually the treasurer or finance officer of a university has to sign, or the Dean on his behalf signs when project grants are put forward and they look very critically at what they contain including the supporting costs for frastructure. They go through the universities which critically examine submissions, so it would be unlikely they would turn them down once they were granted.

402. Because of the research assessment exercise and so on, they have to take the money and run?

(*Sir Leslie Turnberg*) Sure.

403. Right. I want to ask about the overseas governments' matching research funding. Do you know of that level of investment by your members in medical research being affected in some way by that, and how? There are agreements you have with other countries now, organisations in other countries, does that affect anything in this country in terms of the medical research that goes on?

(*Ms Garnham*) There is an increasing amount of money going overseas, a lot of it in Europe, where there is not the same debate about charities having to meet infrastructure costs in most European Member States. The two major ones, Ireland and Australia, which involve the Wellcome Trust, I understand were individually negotiated agreements to attract Wellcome Trust money. The thinking of the charity sector throughout Europe and also in North America is roughly the same: that the funding of the university infrastructure is the responsiblity of the Government. Where universities do not have the debate and say: "Well if you are going to pay for this project grant we want an extra 40 per cent or whatever" then obviously it is quite a flexible system in some of the countries.

404. What do you think our new Government should do in that relationship, that model you have just presented? Advise us.

(*Mr Logan*) We think that the Government should take responsibility for covering that element of the cost. We think that our perspective is very clear, we are Medical Research Charities which have got

[**Dr Gibson** *Cont*]

entirely clear objectives to eradicate the individual conditions that are in that and there will be occasions when our aims are mutual to some of the aims of some universities. On those occasions we can indeed and do fund some of the infrastructure costs. As a general rule we could not accept a levy for infrastructure costs for the educational establishment because in many cases it would be outside our Trust Deed apart from the fact that we would not wish to.

(*Sir Leslie Turnberg*) We really looked to the public sector to ensure that universities were capable of undertaking research.

405. Do you think there is going to be a growing trend now of this relationship with governments abroad and organisations abroad?

(*Ms Garnham*) Research is very international anyway and particularly the rare diseases where we have seen the strongest move towards funding projects abroad. There are other factors that make it logical for them to take up opportunities particularly in Europe. Yes, where universities provide an attractive environment and where the charity can see very good value for money then it is going to be encouraged to fund research and we do encourage our member charities to use overseas advisers as well to monitor international quality so there is this international element to the way they are funding research. What is important is that the charity sector's cultural thinking across the world is the same and that is they are there to fund particular areas of research and the environment in which they are funding it is really the responsibility of the Government. They see it as a partnership and I think it is the opportunity to build on a partnership rather than saying to charities: "Well if you want it done you should pay an add-on or loading to be able to achieve that", actually to come out to the charity sector and say: "Yes, we would like to encourage this partnership by matching funding or providing the right environment in which you can pursue it".

406. What you are saying then really is if something like that does not happen in this country more will go?

(*Ms Garnham*) It is likely.

407. The answer is yes, in other words, the trend will continue you think unless something happens here?

(*Ms Garnham*) I think it is also a trend outside the university system and that is another aspect. 17 per cent of the money from AMRC charities is already in free standing institutes outside the university system. In those situations charities are meeting the full cost of the research but it is totally accountable and very transparent for them and they could still make a judgment about value for money. It is also firmly within their objects because the research is something that they are specifically allowed to do in furthering their own objects.

(*Sir Leslie Turnberg*) It is true too that research is much more international than it was. There is an inflow of international monies into research in the UK as well as out.

Dr Jones

408. Do you have any figures for that? Presumably the charities you represent are all British based?

(*Ms Garnham*) UK based.

409. Most of your investment at the moment is in the UK; do you know what the figures are the other way? Compared to the amount of money that the UK based charities are spending in this country, what amount of charitable resource from overseas is coming here?

(*Ms Garnham*) That I do not know.

(*Mr Logan*) I would think it is very small but it exists.

410. Are you happy with the Funding Council's formula for calculating the research elements of universities' block grants?

(*Sir Leslie Turnberg*) Currently it is 40 per cent and the proposal in the Dearing Report is to increase this to 100 per cent. I think that this could potentially cause some distortion in the arrangement. We would be very concerned if money was simply transferred from the funding councils to the research councils. This would create a problem that the funding for research which came through research councils would be supported in the universities, but funding through an alternative route as from major charities in the AMRC would not have their infrastructure and indirect costs met. So for example there is quite a number (the Cancer Research Campaign, The Arthritis and Rheumatism Research Campaign, British Heart Foundation) which fund a high proportion of research in those areas with not a lot of MRC support. The indirect costs of those areas might be neglected if all the money for indirect costs went through the research councils.

(*Ms Garnham*) There is a volume measure in the current funding formula for charities' income and I think there are problems in the data that it is based on. One of the points that we made to the Dearing Committee was that we use a figure in the funding formula which treated all charitable funding the same, whether it was for a building or for a project grant. The AMRC's view is that an emphasis should be placed in the funding formula that rewards the universities for competitively awarded volume research particularly and does not treat all external funding or all charitable funding with the same type of volume measure. Clearly it is different if you get a million pounds in for a building than if you have a million pounds for project grants and there are very big differences in the way universities account for charitable money.

Dr Gibson

411. How does the charity funding for research affect the RAE rating of Departments would you say?

(*Dr Hince*) I would say it influences it quite considerably. Certainly my experience as an assessor on the RAE was that high quality research funded by the charities and therefore reflecting on the recipient of that research was equated equally with similar grants received from say the Medical Research Council.

[**Dr Gibson** *Cont*]

412. The relationship with the number in the RAE and the amount of money that comes in or the number of papers—is there a formula that you work to?

(*Dr Hince*) I think the various RAE panels used different formulae to arrive at that. Generally there is some comparative multi-component measure of excellence, whatever one means by that.

Dr Kumar

413. I think you touched on the issue of infrastructure investment briefly and I want to explore that a little bit more. You may have seen the comments by Wellcome Trust, and I quote, that "the overall state of the university infrastructure is the responsibility of the UK Government" and "no other source or sector can rectify the serious infrastructure problems." Do the majority of your members agree with that view?

(*Ms Garnham*) There is the problem that if you ask the charity sector to fund the infrastructure with its existing income you will reduce the volume of overall research. We would be against it for that reason. The second point is with our members we have agreed a position statement which says that the research infrastructure in universities is actually the responsibility of Government. So providing the proper environment for research is the responsibility of Government but where charities can within their trust deeds and with their financial ability they will help universities where there is a mutual interest to do so. The evidence is very much that way from our members. They are spending about £150 million a year on the sorts of grants that provide for some of the research infrastructure as well. These are the sorts of grants towards buildings and refurbishment, the modernisation of equipment, major equipment, centre grants and departmental core funding. Even if a charity endows a chair or provides funding for a chair there is actually quite a lot of flexible funding within that for running costs which is also for the research infrastructure. Also they are contributing to the critical mass of activity in the university through academic numbers, increased intellectual property, and they are providing time for teaching, for clerical work, for administration. There is quite a heavy investment in the university's wider business as well.

(*Dr Hince*) The point I would make is that quite rightly when one is in discussion, reference is made to the Wellcome Trust but I would like to make it clear to Members that other charities, within their more limited finances, do provide similar amounts of infrastructural support. If I quote from the Cancer Research Campaign: in the last three years we have provided £3.4 million for new laboratories in universities which will not be used exclusively by CRC-funded researchers. On a regular basis we provide also in excess of £2.5 million for equipment. I would regard this as part of the infrastructure. The Campaign funds 18 full-time professors who are indistinguishable from HEFCE-funded professors, one of whom at the current time is acting as Dean of a large department. I think the charities do in a considered and supportive way contribute to infrastructure within the universities.

414. Say for argument's sake that you cannot find additional money for infrastructure, would you favour greater selectivity in allocation of available resources?

(*Dr Hince*) Speaking for the Cancer Research Campaign I would have to answer yes, we would. We have a duty to those who give us money to maximise the benefit that derives from that. Putting that money into a well resourced university department may well give us greater rewards than having ourselves to use part of that money to create such an environment.

Mr Jones

415. Can I just explore that a little further? I am getting a slightly confused view of the infrastructure investment. It seems to me that you are not saying it is wrong, whereas I think Mr Logan was saying it was against the Trust Deed, but is it wrong for medical research charities to make a contribution to overhead costs of research which may include the use of infrastructure and equipment if the research they fund places demands on those resources?

(*Mr Logan*) I think that I must have expressed myself badly. What I said was it may be against the Trust Deed simply to pass across a sum of money to a higher education institution through a medical research charity for some undisclosed infrastructure. However, I did say that where the interests of the charity and the university are clearly mutual there are many, many examples of charities, as Dr Hince was acknowledging, providing that sort of support. Our difficulty is that nobody has yet been able to express to the charities what precisely they mean from the higher education end by infrastructure costs and what price lays against these costs in order that we can make a judgment as to whether it is in our charitable interest to support that or not.

416. Would medical research charities be more willing to fund those overhead costs if the costs were clearly calculated?

(*Mr Logan*) We would not necessarily wish to put up all overhead costs, obviously. There would be areas where we would regard it as being a governmental responsibility to provide the support. We have had preliminary discussions with HEFCE already about the possibility of identifying these costs and beginning to try and decide between us who would be most appropriate to pick them up.

417. What would be the consequences of requiring, as a regular part of your dealing, the charities to pay a contribution to the indirect costs of the research they fund in universities?

(*Mr Logan*) The consequence would be a reduction in the amount of science funded.

418. Would we lose projects?

(*Mr Logan*) Yes, you would lose the percentage of the projets that you had added on to the overhead.

(*Ms Garnham*) One of the things that one has to face is that if you were to ask them to pay a percentage levy on all grants the charities would have to decide whether that came away from, say, project grants by reducing the number of project grants or perhaps taking it away from other forms of longer term support, taking it away from chairs or centre grants. One of the things that the university system

[**Mr Jones** *Cont*]

needs to decide is the balance between the short-term funding that comes through and the longer term funding. If you ask charities to change the way they are doing it you have actually got to make a choice about which area of funding suffers. There is no consensus coming from universities about which areas they would like to see cut. If you look at how universities get the money in, some of them get 20 per cent of their money from the AMRC charities as short-term funds and 80 per cent of it in longer term forms of support. Clearly they would not suffer so much if project grant numbers were reduced but other universities would be greatly affected by a cut in project grants. Perhaps also the much smaller areas of medical science research activity in the UK would also be hit more directly. The main problem is the percentage levy. Charities under their research activity cannot give universities £40 for every £100 to pay for university administration, swimming pools, libraries and things, they are research charities and they can pay towards research.

Dr Jones

419. Is there any different policy in relation to charitable funding of other organisations such as Research Council institutes or NHS organisations? Is it exactly the same approach you take in those different bodies to that you would to the universities?

(*Ms Garnham*) With the NHS we do not have these sorts of problems. There has just been published a statement of partnership with external funders of research for the NHS and there we have agreed, and it is quite clear that meeting the patient care costs associated with research and other NHS costs associated with research are the responsibility of the NHS. It has been very helpful to go through that process with the Department of Health. Throughout the voluntary sector these sorts of agreements are being drawn up. One of the Labour Party's manifesto commitments was to build partnerships with the voluntary sector. This has not happened yet in the higher education sector.

Mr Turner

420. Leaving aside the question of who is responsible for picking up x or y percentage of infrastructure costs, it seems to me if these infrastructure costs are not picked up somewhere in the system everybody starts to have problems, including yourselves, especially if the product of this is increased selectivity in research because you will have a declining research base to support with your charitable efforts. It seems to me that there has to be some sort of minimal critical mass. I would like to know whether you feel we are heading towards that point, whether you see this as a problem and, if so, whether you can quantify it?

(*Mr Logan*) In the longer term clearly it is a problem, whether it is quantifiable or not I am not so sure. The irony to us in all of this is of all the parties concerned probably the only one with an absolute clear aim of spending more year on year is the charitable sector, certainly the only one whose long-term aim is to do themselves out of a job is the charitable sector, and yet it appears that it is the charitable sector, because it is growing and because it is successful, that is seen as a milk cow by the other parties in the equation. Without wishing to be unnecessarily aggressive towards higher education establishments there is quite a lot of money in that system which is not being applied for these purposes. Many, many universities have their own fund raising charities and many of them are extremely well endowed but there is no particular move on their part to apply those funds to infrastructure.

(*Sir Leslie Turnberg*) I think that the research charities are responsive to requests and good quality requests for research and the supporting costs that go along with those are looked at very carefully by the research charities. They are responsible and accountable to the donors for the money they give out. They would expect the universities to be responsible and accountable for what they are requesting. What the charities would not be able to do would be to give a straight percentage across the board about which we know nothing.

(*Ms Garnham*) There is a worry in the Association too that if you sought to fund university infrastructure by loading short-term grants you inbuild a level of instability which is a problem for the universities. We have reduced the number of project grants that charities are supporting and it is a smaller percentage now than it was ten years ago of the overall funding but it still would not be appropriate to load projects and programmes in order to support the infrastructure.

Mr Beard

421. To what extent do your members support projects in overseas administrations?

(*Ms Garnham*) Last year that amounted to £38 million.

422. What are the arrangements there for paying overheads?

(*Ms Garnham*) The Canadian charities have an agreement to pay a maximum of eight per cent.

423. Eight.

(*Ms Garnham*) And the thinking of the other charities is that they will not pay a percentage levy on charity grants so where our charities are partners with overseas charities it is not asked of them.

424. You are not paying overseas overheads at all?

(*Ms Garnham*) No.

425. Not just as a percentage?

(*Ms Garnham*) No.

Dr Kumar

426. Sir Ron Dearing suggested a revolving loans fund of £400—£500 million. Would you envisage supporting that idea and would you be willing to contribute to that?

(*Mr Logan*) We do not really view it with any great enthusiasm. We exist to fund work which we think is good without having to make loans. We prefer to do it by making grants. We would not see any necessity to move away from that particular methodology. We may find legal difficulties also again with the Trust

[Dr Kumar *Cont*]

Deeds because charities are very circumscribed in the ways in which they are allowed to apply their money and making loans is not seen as a charitable purpose.

Mr Turner

427. Your body seems to think that university research is somewhat expensive and that seems to be your perception. What is this based on? Do you think there are cheaper organisational bodies that could provide cheaper research?

(*Mr Logan*) I think what we have said is were this sort of levy to be introduced it would be extremely expensive.

428. That is a different question.

(*Mr Logan*) I think that was what was intended certainly.

429. That is our misinterpretation of your words. It comes back to this basic precept for charities, then, that you do not feel you can do your job in achieving your aims and objectives as charities without the universities providing the base?

(*Mr Logan*) Without the general base being provided but in certain circumstances we would help to provide some of the elements of that base but only—and it would be an absolute prerequisite within those circumstances—if things were clearly itemised and clearly costed. That is the huge difficulty we have because there has been no costing, not even any listing of what these elements of infrastructure are.

Dr Jones

430. What detail do you require when you say "clearly listed"?

(*Mr Logan*) We are slightly at sea, I confess, because I do not know when someone discusses infrastructure what proportion of the personnel department of the university they intend to apply to the running of one small lab that might have one project in it. It is that sort of issue that we really need to explore with the universities and with funding councils to find out what exactly people regard as being in this particular pot and then putting prices on to it and deciding who would be most appropriate to pay the bill.

431. You ought to be careful to make sure this does not impose an extra overhead if you go down to too much detail.

(*Mr Logan*) I think it is slightly sad that for organisations like this the costs of activities are relatively inaccurate without an extra overhead.

Dr Gibson

432. Do you think the public would be angry if they thought that the money was going into some of this?

(*Mr Logan*) I think that the public reaction is a very interesting observation.

433. Do you have any evidence of that?

(*Mr Logan*) We do not have any direct evidence of it because we have not accepted any such levy. We do have the evidence of constant public scrutiny as to the levels of administration charge that we ourselves place upon activities as to the cost of fund raising. That is a constant matter of public concern. I am sure, personally, that if a man on the street putting a pound into a collecting box was told that not only was about 20 pence going on fund raising and admin costs but 40 pence was going on funds for the higher education institutions he might be less willing to put the pound coin in the tin.

Dr Jones

434. So you think that you could actually offer the universities some tips on how they could be more efficient?

(*Mr Logan*) One of my suggestions would be that we might impose a levy upon them for our exceptional costs.

Dr Gibson: They might reward deans.

Dr Jones

435. Earlier on I asked you about dialogue with the universities and I think the reply I got was that was on an individual institutional basis. Would matters improve if you did have, perhaps, a dialogue with universities as a whole rather than on an individual basis?

(*Ms Garnham*) We do have contact with the CVCP. Yes, I think it would be very helpful to talk to the sector generally. We went through a very helpful series of meetings under the chairmanship of Sir Colin Campbell looking at infrastructure funding arising out of the life sciences part of the Technology Foresight and we found that brought together the universities, the funding councils, OST, us and industry. We found that at the end of the meeting, heated though many of the discussions were, there was actually a much better understanding of where each organisation was approaching the problem from. Out of that as well arose promising discussions with HEFCE. With CVCP as a whole we have tried as well with the Medical Committee and Dearing has given us a platform and an agenda with which to have dialogue with them.

436. So you might perhaps pursue these kinds of discussions in the future to try and improve the efficiency of the system?

(*Ms Garnham*) Yes.

Dr Gibson

437. I guess you would agree that medical charities have a role to play in ensuring that the research they sponsor reaches some developmental stage if possible. How do your members typically go about achieving this value for money, if you like, telling the public about where the money has gone?

(*Ms Garnham*) One of the things that all AMRC charities have to fulfil is they have to make publicly available information about all the grants that they have made to institutions and that is something the AMRC monitors. We are very keen also that they should work with universities to develop research that really does benefit the public and to properly protect it so that there is the proper opportunity for

[Dr Gibson *Cont*]

commercial development. It is not very easy under charity law for charities to invest in the development of a product for profit but it is very important that they fund the research and look after the results of the research in a way that does not limit that. We are about to publish guidance for charities on how to implement that thinking right the way through from agreements with institutions to monitoring how research is carried out.

438. Is it so even throughout the membership?

(*Ms Garnham*) Yes. Smaller charities do not have expertise inhouse and the expertise of different universities varies in different fields. An awareness of the need to protect the outcomes of research which is something our charities do have, whether individual researchers are aware of that all the way through is something that the charities need to work on to increase their understanding.

Dr Jones

439. Thank you very much. I think we have come to the end of our questions. Certainly I have learned quite a lot from the information you have given to us and I am sure that the Members of the Committee would like to join me in thanking you for coming and meeting with us today. Thank you, Ms Garnham and gentlemen. Before we do wind up this session if there are any points you would like to make I would be happy to allow you time to do so.

(*Ms Garnham*) No, thank you.

Dr Jones: Thank you very much.

Memorandum submitted by the Wellcome Trust

1. The Wellcome Trust welcomes the opportunity to comment to the Science & Technology Committee on the proposals contained in the National Committee of Inquiry into Higher Education's report ("Dearing Report").

RESEARCH FUNDING

2. The Trust strongly endorses the report's finding that there is a research funding crisis in universities.

3. The implications of this for the UK are profound, because there is now clear evidence that economic growth in most countries is science and technology led. Globally, there is a premium on goods and services that have a high "knowledge content", and those countries that produce these stand to generate considerable wealth. This imperative is reflected in the investment decisions of many governments overseas, but the UK seems to have been slow to respond to the opportunities. British levels of funding for science and technology are now lower than most of our competitors.[i]

4. In the biomedical field where, thanks to the Wellcome Trust and other charities, there is as much money being invested again as the government invests through the MRC, the strength of the UK in this field has been maintained but not enhanced over recent years.

5. There is extensive evidence (from the House of Lords, the Bank of England and the CBI/NatWest Survey[ii]) that the UK continues to be relatively weak in its ablility to get research translated into patents, which are exploited commercially. Today, it is not just "applied" research which has commercial potential. In biomedical science, especially, blue-skies research has a direct impact on patentable and exploitable products[iii]. Under-investing in basic research does not make commercial sense.

6. The Trust believes that the Government should take the lead in attempting to increase overall investment in UK research and development. In addition to increasing its own expenditure in this area, it should create appropriate fiscal and financial incentives for R&D investment by industry.

7. Whilst universities and industry in the biomedical field have made great strides towards working together, there is a tendency to lay the blame on universities for British industry's failure to take advantage of original research carried out in this country. However, industry/university partnerships are the prime responsibility of industry, which should take the initiative in facilitating such collaborations.

INFRASTRUCTURE INVESTMENT

8. The funding crisis is particularly acute with respect to universities' infrastructure. The current amount needed by universities to replace their old *research* equipment stock alone is estimated to be in the region of £500 million[iv] over the next five years. Furthermore, the estimates for the funding gap for indirect research costs (excluding equipment), quoted in the Dearing Report, range from £137 Million to £720 million.

9. The Trust believes that the overall state of the university infrastructure is the responsibility of the UK Government. No other source or sector can rectify the serious infrastructure problems which have been allowed to develop in UK universities. The Trust welcomes David Blunkett's announcement that a further £165 million will be made available to universities to bridge the gap before tuition fees are introduced.

However, the amount quoted is considerably less than the amounts that are needed as quoted in the Dearing report (£350 million in 1998–99 and £565 million in 1999–2000) and it is not clear how much will be made available for research funding.

10. The Wellcome Trust is a leading funder of biomedical research and has a proud record in realistically funding salaries and all specific costs associated with research and providing the equipment and facilities needed by Trust-funded researchers. Since 1993 the Trust has invested £123 million for research buildings in the UK university sector and about £90 million on equipment, all of which now remain in the university sector. This investment has been effectively targeted at ensuring the continuation of focused research by the UK's most productive and promising scientists. To continue this investment in biomedical science, the Trust has established an infrastructure panel with a budget of £15 million per annum.

DUAL SUPPORT AND OVERHEADS

11. The Trust supports the continuation of the dual support system. The proposed £110 million transfer from the HEFC to the Research Councils would not address the overall funding crisis facing UK research as it would provide no extra resources.

12. The HEFC funding stream is important to universities because it helps to foster new areas of research that are not yet ready for research council funding. Without adequate dual funding, universities risk losing their flexibility and could simply become "service providers" for research funded by grant-making agencies who have no responsibility for "seed corn" research. Universities would thus find it hard to fund seed corn work, to develop ownership for their research portfolios or to plan strategically. We do not endorse this proposal.

13. Whilst supporting the retention of the HEFCE research spending, this should be more carefully audited so that it is clear that it is being directed to the people doing the research.

14. The Trust will continue to meet direct[v] research costs of the science which we have peer reviewed and which meets our criteria in line with Sir Henry Wellcome's will. However, we do not accept that it is any part of a research charity's responsibility to pay for the general upkeep or running of a university or its basic fabric (including libraries, personnel departments etc).

15. The Wellcome Trust is keen to maintain its practice of locating its research funding in UK universities and, thereby, to help train the next generation of research scientists. However, we believe the universities must be fully supportive of and integrated with such research so that it does not take place in an isolated "research institute" away from the teaching and education ethos. The university should therefore take some responsibility for the funding and support of charity funded researchers and for their integration into the university. Should an outside body be required to fully fund a research group, so it became a "bolt on" to a department, the value of its location at a university would be open to question.

16. The Dearing report discussed options for increasing the overhead rate for government funded grants to a level above the current 45 per cent. Whatever figure is finally agreed, the Trust believes that it should be applied consistently across the UK, to prevent competition between universities on overhead rates. In the long term, this could lead to an unhealthy polarisation with the poorer research universities unable to escape a low-funding trap.

RESEARCH SELECTIVITY

17. The Trust endorses the need for more selectivity in research. The UK cannot remain pre-eminent in all research fields and the answer is to target funds to the country's best research units (be it at departmental, team or lone researcher level). By applying the principle of funding only the highest quality grant applications, the Trust already finds that over 60 per cent of its expenditure is concentrated in just 10 universities.

REVOLVING LOAN SCHEME

18. The Trust does not endorse the establishment of a revolving loan scheme for buildings and equipment (recommendation 34). All "loans" have to be repaid at some time in the future and carry an interest expense until repayment. The Trust does not believe that universities have a sufficient future income stream to repay the loans. Furthermore, universities' future financial situation will be mortgaged. As they will remain dominated by government grants, the only prospect of repaying the loans will be dependent on increased government funding. The Trust believes that where infrastructure and equipment are needed, they should be funded in full and up-front.

ACADEMICS AND TEACHING

19. The Trust endorses the proposal that not all academics should be involved in research. There should be encouragement for academics whose primary focus is teaching. The establishment of a professional qualification for academic teaching is encouraged.

RESEARCH TRAINING

20. The Trust is in favour of the proposed research training at the PhD level. The Trust has already piloted a four-year PhD training programme and has found that one of the most important issues is the quality of the research environment. We recommend that universities be required to demonstrate that they can offer a high quality research environment and proper supervision before they are allowed to offer research degrees. These proposals are broadly in line with some of the recommendations contained the Harris report[vi]. These recommendations included a code of practice to require institutions to provide appropriate facilities and the need to focus research training in "institutions which have a pervasive research culture, and can deliver excellence in research education."

21. We regret that the Report gave such low attention to post-graduate education and to post-doctoral training. There is a major problem of insecurity at this level which the Report's proposals will not address.

STUDENT FEES

22. The Trust believes it is essential that the government should provide bursaries for students on longer courses such as medicine and dentistry (as well as postgraduates). Able students from lower income families will find it almost impossible to apply for these longer courses unless help is available to them.

23. The Trust also believes that academic medical research will suffer in the long term if medical students are discouraged from extending their courses by an extra year to do intercalated research degrees. We recommend that fees should only be paid by medical, dental and veterinary students for the length of a normal undergraduate course at their university.

24. Academic medicine is highly dependent on research-minded young doctors. They will be discouraged from the relatively lower paid life of a clinical worker if they qualify with overwhelming debts.

STUDENT FEES TO TREASURY?

25. The Trust is strongly against student fees being paid to Treasury rather than directly back to the higher education sector. We believe there will only be public acceptability of the fees if it is clear these are going to the student's education. Their introduction offers a unique opportunity for a "catch up" in university funding—one that should not be missed.

ESTABLISHMENT OF AN INDEPENDENT POLICY ADVISORY BODY

26. The Trust welcomes the proposal to establish a politically-independent science policy advisory group. The Trust recommends that the new body should make its advice to government public, whilst recognising that it will from time to time want to give confidential advice.

ESTABLISHMENT OF A HUMANITIES AND ARTS RESEARCH COUNCIL (HARC)

27. The Trust supports the establishment of a new research council to oversee research into the arts and humanities. The Trust currently invests £8 million per annum into research and academic activities relating to the history of medicine.

26 September 1997

REFERENCES

[i] In 1995 the total UK expenditure on R&D as a percentage of GDP was 2.05 per cent, as compared with the OECD average of 2.16 per cent. In the same year, the USA invested 2.58 per cent of GDP in R&D, France 2.34 per cent and Germany 2.28 per cent. The recent UK R&D Scoreboard Produced by the Department of Trade and Industry again highlighted UK industry's poor record in R&D expenditure compared to our competitors.

[ii] The three studies are: House of Lords Select Committee on Science and Technology, *The Innovation-Exploitation Barrier*, March 1997; Bank of England, *The Financing of Technology-Based Small Firms*, October 1996; CBI/NatWest *Innovation Trends Survey* 1997.

[iii] Anderson J et al, *Human Genetic Technology: Exploring the Links Between Science and Innovation*, Technology Analysis and Strategic Management Vol.8(2). pp135-156. 1996.

[iv] PREST, CASR and the University of Manchester, *Survey of research equipment in United Kingdom Universities*, 1996.

[v] The following list are examples of items that are not considered to be direct costs: salaries of administrative staff or other university funded staff seeking to reimburse part or all of university funding, power supplies, fuel, gas electricity, animal licence fees, Value Added Tax, general office expenses, bench fees.

[vi] HEFCE, CVC and SCOP, *Review of Postgraduate Education* (Chaired by Professor Martin Harris, University of Manchester), May 1996.

Examination of Witnesses

PROFESSOR JULIAN J B JACK, Deputy Chairman, Wellcome Trust, Department of Physiology, University of Oxford, PROFESSOR CHRISTOPHER EDWARDS, Governor, Wellcome Trust, Principal, Imperial College School of Medicine, and MS DIANNE HAYTER, Director of Corporate Affairs, were examined.

Dr Jones

440. Welcome, lady and gentlemen to the next session. You will have heard what happened. We will repeat some of the questions to you and it will be interesting to hear what you have got to say. In the same way as I suggested to the first group of witnesses we will crack on with the questions but if you have anything you want to add at the end then please feel free to do so. I will start off. You say that the Government "should create appropriate fiscal and financial incentives for R&D investment by industry". What specific measures would you like to see?

(*Professor Jack*) For investment by industry?

441. Yes.

(*Ms Hayter*) We could not quite hear.

442. It is about incentives for industry to invest in research.

(*Professor Jack*) As Dearing suggested with the industrial partnership fund?

443. That was one mechanism, yes.

(*Professor Jack*) Yes, we would welcome those kinds of measures. We regard it as part of our charitable remit not just to fund basic biomedical research but also it is under the will of Sir Henry Wellcome that it is actually a requirement for us to make sure that such research gets applied to the wellbeing of animal and human kind. We are extremely concerned and interested that the kind of research we are funding does get transferred right through.

444. What specific incentives would you envisage the Government introducing to achieve this?

(*Professor Jack*) Well, some matching funding with industry for those forms of applied research, just as Dearing suggested. With respect to industrial research and the amount to which that is conducted either in-house or sent out to the university system and other research agencies, clearly we would like better corporation tax breaks.

Dr Gibson

445. Why is it, do you think, that UK industry has been slow to exploit the results of original research as you suggest in your memorandum?

(*Professor Jack*) I am not sure that as a Trust we can address the areas where perhaps the exploitation has been rather lower. I think it is a very striking thing that in the form of research that we represent, medical research, if you take, for instance, just the three major pharmaceutical companies, on capitalisation and profit, etc., they represent about one-sixth of the FTSE whereas their R&D spend is about double that in percentage terms. The particular sector of industry that is linked to biomedical research I do not think has been unwilling to exploit. The other area where things have been slow in this country as compared with America is perhaps in various biotechnology companies but we are hoping certainly that will develop quite rapidly, particularly after the major investment of £180 million that we have made in the Hinxton site in order to get genome sequencing, not just human genome sequencing but also micro-organisms. We are happy that the tuberculosis bacilli sequencing has just been completed with our funding.

446. So you would not like to say there are any specific barriers? Do you say that you have broken those barriers down in the development of these initiatives?

(*Professor Jack*) No, I think not. There are some respects in which we as a charity, partly because of problems sorting out the Charity Commissioners, the Inland Revenue and Customs and Excise, have been rather slow out of the blocks in getting our own technology transfer company (TT) set up. It has been unclear whether it should be a charity or not; and if it is not a charity whether we can award it and so on. That has required a lot of negotiation. Amongst other things, one thing that we flagged to Gordon Brown's committee on the review of charity taxation is that on some views—it is not yet finalised—if we did give large amounts of money to a TT company of the kind that we are envisaging, then we might have to pay VAT on all our grants. That has been a considerable impediment to us activating the company. In principle we have made the decision to invest £20 million in such a company, be it a charitable company or not, where its remit—and it is relevant to this Committee—is that it will be in joint partnership with the universities and the returns from any profits made in the long-term will go back to the universities as well as the individual scientific discoverers and the Trust.

447. The other thing is how does the Trust deal with the issue of patenting and intellectual property rights? It has all been a big learning curve for all of us, how do you get on with that?

(*Professor Edwards*) This £20 million is designed to set up the vehicle which will enable us to take a much more proactive role in relation to exploiting the results of our investment in research. Clearly what we are wanting to do is to make sure that far more of the projects and programmes that we fund actually lead to exploitable inventions and areas of research. At the moment we feel this is a big gap in the UK, often because people do not think about it, clearly because the resources that are required are escalating resources in terms of initially investment to get your patent filed and then the costs go up exponentially in order to get it in various countries around the world. What the Trust is saying is that should not be a barrier and we are prepared to put resources in to make certain that individual research workers can overcome those barriers.

448. As you say, individual research workers are *au fait* with it all. Do you feel you are getting through to them then or is it going to take a few years?

[**Dr Gibson** *Cont*]

(*Professor Jack*) It is going to take time. One of the decisions that we had to make was whether to follow the CRCT, with whom we had a collaboration for a while (the technology transfer arm of the Cancer Research Campaign) and take over the IPR so we could ensure and drive through the exploitation, or whether to leave the IPR with the universities. We have made the decision now to leave the IPR with the universities. That is much more friendly as far as the universities are concerned. Since our primary concern is to collaborate in a proper partnership with universities we are happy it has been set up in that way.

449. So in the exploitation of the research and best practice, is that being communicated through the network adequately do you feel?

(*Professor Jack*) What do you mean by "network"?

450. The researchers, all the people carrying out the project.

(*Professor Jack*) Once our company is up and running it will of course be going out into the university sector and meeting university researchers quite regularly and that is clearly the best way to make the communications. There are plenty of areas where there is a lot of close communication already between Trust staff and the researchers that we fund.

(*Ms Hayter*) The other thing that the company will do, of course, is have good contacts with venture capitalists, and that is really important because that is what the individual researchers do not have. That will be a service we will be able to offer to universities.

Dr Jones

451. Have you had contacts with, perhaps, other universities that have been successful in pioneering these kinds of developments, such as Cambridge or Warwick?

(*Professor Jack*) In the early days of deciding how to proceed we did go to the major universities, to the senior individuals from each of the technology transfer departments of those universities which had them. We got them together to have discussions about what would be the right sorts of guidelines, how we should divide things. We sought a lot of guidance with them at a relatively early stage.

Dr Kumar

452. In your submission, as you may have heard me mention earlier, you recognise there is a funding crisis in investment and infrastructure. You also say that it is the responsibility of Government to bridge the gap. Let us assume if there is no action to improve the level of funding for research in universities, what would happen?

(*Professor Jack*) I think the Trust's perception of what has been happening to Government's whole civil R&D funding is a steady decline in real terms let alone in research inflation terms. Research inflation is rather higher than ordinary RPI. There has been a dramatic decline in that. What has kept some stability in the total amount of research funding going largely into the university sector, because the university sector represents 80 per cent of the science base in terms of science funding, is that there has been a compensatory expansion. In the last five years, on Bob May's figures just presented in a recent talk, business contributions to the university sector have gone up by a quarter, 25 per cent, charities have gone up by about 50 per cent and EU funding has gone up by more than double. Those of you who have seen Sir Colin Campbell's submissions to the Dearing Committee on overheads will know that the EU funds often do not bring any overheads with them. It is not just the expansion of charity funding that needs to be considered. Of the three, businesses do pay overheads in the university sector. The ones that are creating problems for the university sector are charity funding and EU funding and they are roughly comparable. The Government has got to make a decision on what it is going to do about overheads for EU funding, let alone what decision it makes about charity funding in general. If the Government makes the decision that it is going to impose an overhead on charities I think the effects may differ depending on the charity. I would like to draw this Committee's attention to the fact that we are governed by a Will in which there is no mention of funding either in this country or in the university sector. It happens to be the choice we make at the moment.

(*Professor Edwards*) On a particular focus, Dr Kumar, you say what are the consequences of not investing in infrastructure. Let us take a particular example of the facilities that are available for clinical research in the UK; if you look critically at what has been happening in clinical research, the citations of articles published from the UK have been going down more rapidly than in any other field. We are actually producing about the right number of publications but they are being cited dramatically less frequently. Over 50 per cent of the publications are never cited. That was information which was actually before the impact of the Government Health Service reforms which have further increased the crisis within hospitals in terms of the space and all the facilities that are required to do clinical research. The Trust has been extremely concerned about this. We have had a clinical research facilities initiative competition, and have just announced the results of it, where we are going to build five new clinical research facilities. Those facilities will concentrate the resources coming from the NHS research and development within them so as to produce centres of excellence for clinical research. We had an international committee, mostly Americans, to come over to judge this, to make sure that it was fair; they were horrified at the lack of facilities for clinical research in the UK. They were simply amazed as, for 25 years, they have had clinical research centres. I think the answer to your question is you can not invest in this, but there will be serious long-term consequences in terms of our output and our ability to compete.

(*Professor Jack*) The answer to your question about the university sector, other than the medical schools, is that exactly the same thing could happen. If the Government does not make that investment there is going to be an extreme deterioration there because it is our perception that most universities are really now in a state where they can barely afford to accept research grants.

[**Dr Kumar** *Cont*]

453. Can I just stretch you a little bit and ask what additional funding would you need for the standard of research equipment that would be necessary for the infrastructure? Would you like to put a figure on it?

(*Professor Jack*) I think there is an issue about what is meant by infrastructure. There is buildings, there is equipment. You have of course received submissions, I am sure, on both of those. In addition, for the amount of money that is coming in with other kinds of infrastructure support, such as full funding, some degree of continuity, proper training of people and so on, those are large parts of how we invest at the moment in the university sector. We are paying those costs. If we were asked to pay overheads we might withdraw from them. Let us just pick something that you may not think of as infrastructure, but I think it is key to the long-term continuity of research success in this country, and that is the training of doctoral students and post-doctoral students in their early careers. We have a budget for this financial year of £50 million which is purely in training. You will have already heard evidence from the Medical Research Council (MRC) that their contribution in the same sector is £30 million. That gives you an idea of the kinds of total needs of training to get a properly skilled research workforce in this sector. We are putting that £50 million in and there is a variety of other ways in which we are putting money in other than just supporting really top class researchers, other forms of support, which if that was all withdrawn would have grievous effects on biomedical research in this country. In the last five years in terms of more direct infrastructural ones, namely building and equipment, we have put in over one quarter of a billion pounds. You may wonder, given our reluctance to fund infrastructure, why we have done that and I think there is an answer at two different levels. At one level, although we have been very reluctant to do it, we have a commitment. We spend about 90 per cent of our total research funding in UK universities, although we are not obliged to, and we have wanted to keep that going because there is loyalty at the Trust to funding in this country and we have seen that as a need. We have put in that money primarily to people that we ourselves are funding. We are funding 3,500 researchers in the university system at the moment. There are infrastructure needs in terms of buildings, refurbishment and equipment that we have seen is necessary to go into the university system because of the neglect of that funding coming through the arm of funding which we think it should be coming through.

(*Professor Edwards*) I do not think we disagree with the sort of figure that was in the Dearing Report suggesting that £500 million over the next five years was required. That is over and above the sort of investment that we have been making. I think that is the sort of ball park figure that we should be looking at.

Mr Turner

454. You have already strayed on to the angle that I wanted to question you about because, as you rightly say, your Trust's investment in buildings and equipment represents quite a significant investment in infrastructure which in principle you do not want to be doing because you quite clearly state that you feel the Government should be making that investment. Am I right in thinking then that you have set up your infrastructure panel with a specifically-targeted remit to underpin your grant-giving capacity to make sure that you can usefully continue to do it?

(*Professor Jack*) Its budget is only £15 million a year. In contrast to that, over the last five years where we have been spending £50 million a year. We have set up that infrastructure panel in the hope and expectation that the Government would listen to the kinds of pleas that we and others have been making about the needs of research in the university system. We are quite able to terminate that infrastructure panel if the Government does not respond to those pleas.

(*Professor Edwards*) Mr Turner, you are right. Basically what we are looking at is an ability to focus our research in the universities and to provide relevant infrastructure for our research.

(*Professor Jack*) I think that in that respect, just in case you may feel I am being a little bit too hardline about our feelings about the Government's lack of funding, we are very happy to fully fund research, including direct costs, including refurbishment. We have had that as a convention for a long time. We have never drawn back from providing full funding directly for the researchers and the research that we wish to see funded. What we do not want is some generic tax. We are not a charity that has within its remit funding education and any general overhead tax would inevitably, particularly with the kind of lack of transparency in most university accounting systems, stray into simply funding education.

Mr Turner: I think we hear you very clearly on that one.

Mr Beard

455. You have mentioned in your paper that you are not supporters of the Dearing proposal for a revolving loans fund. Would your attitude be different if you could earmark the loans for particular projects?

(*Professor Jack*) No. I think our basic reaction is that most universities are not in a financial state to borrow any large amount of money and until the financial state of the universities improves we think it would be absolute folly to encourage them to borrow money. That is our basic position. We have in some circumstances ourselves directly been willing to lend money to universities where we are content about their financial and business plans and the clarity of the research use to which they want to put it. Coming back to Dearing's Report, how is that money going to be paid back by the university system? It is like a PFI initiative, unless you have a proper and earmarked and guaranteed supply of income, it is just creating long-term difficulties rather than short-term.

456. So your position is that this deficit needs to be made up through Government funds?

(*Professor Jack*) Yes.

[**Mr Beard** *Cont*]

457. You have mentioned that when you are funding projects you go to a degree to some forms of equipment and infrastructure associated with the project. How far towards infrastructure are you willing to go in funding? At the one end of the continuum there is the direct cost of the project being run and at the other end there are the playing fields and balls. Where in between that would you stop?

(*Professor Jack*) We would like, as part of our charitable remit, that all the funding, including infrastructural costs like equipment and refurbishment, office space or even providing a new building, to be associated with the particular research that we want to fund. We do not think that we should be funding libraries or any general things of that kind. In that respect we have provided in the last five years, just to repeat, equipment not only to Trust funded researchers but to others of about £130 million which represents over a quarter of the total equipment funds going into the university sector.

458. Do you provide that equipment only for the projects you are funding or would you provide it independent of a particular project?

(*Professor Jack*) The remit was that we would expect the projects themselves to be funded, from whatever source. The case for needing equipment, upgrading of equipment or new, better equipment to more efficiently address the project, that was the remit of that fund. Of course, when we are setting up new centres of excellence then we put all the equipment in, along perhaps with the building, right from the start.

459. So you would not worry that it was general purpose equipment, so long as it was relevant to the project you were funding?

(*Professor Jack*) As long as it was needed. You mean like centrifuges or something?

460. Yes.

(*Professor Jack*) Yes, of course. We are pretty relaxed about them being used by other researchers than those that we fund.

Dr Jones

461. Before we move on—a moment ago you said that the universities were not in a fit state to participate in a loans fund and yet earlier on your colleagues from the AMRC were implying that the universities did have funds from their own sources that they were not actually using. Would you care to comment on that?

(*Professor Jack*) Clearly some universities do have funds. Some are rather more fortunate than others in having certain kinds of endowments which can be used. Some have university presses which earn a lot of money and where only a small amount of their profits are returned back to the university, etc. There are various universities where, with proper management, they could of course put their own money in. Clearly as a Committee you will have seen, for instance, the HEFCE figures on the rise in the number of universities that are operating at a deficit, which has nearly trebled in the last three or four years.

Mrs Spelman

462. We have briefly mentioned overhead costs and I would like to come back to that. Do you consider that the charities should be funding the full costs, both direct and indirect, of the research that they commission rather than leaving it to the funding councils to make an additional contribution? If not, why not?

(*Professor Jack*) It is the direct and indirect division where there is genuine lack of clarity. Do you have a particular view about where the division should break?

463. We are just picking up something in your evidence to this Committee.

(*Professor Jack*) I think in there you will find that we say that we are willing to pay all the direct costs, including the following, but we do not regard the others as being appropriate charges.

464. Even when the charity makes demands on these resources?

(*Professor Jack*) On which resources? On the libraries?

465. For example.

(*Ms Hayter*) Maybe I could just say a word about how many of our 3,500 people are actually contributing enormously to the universities. They do six hours teaching a week in the universities as well; they are allowed to do that. They are putting an enormous amount into the universities which we do not get any benefit from. It is something that we are really happy to do but it is an important part of teaching that it is very closely aligned with research so an awful lot of what we are doing is putting a lot into the universities that does not come back in the research that we are agreeing to fund. We are not commissioning any research. I think that is very important, that we are response mode. It is researchers who come to us and ask us to fund a research project that they have got. We do not commission research; we are not in that business.

(*Professor Edwards*) All these people are, in fact, members of the university and as such have the rights to use the library. I think you have to realise, of course, that most big universities have multiple sources of funding so it becomes extremely difficult to then start saying "what proportion of your time is devoted to a Wellcome Trust project versus an MRC project or what have you?"

(*Professor Jack*) Nearly 80 per cent of the publications which acknowledge funding from the Trust also have acknowledgments of other research funders and the average number of funding agencies over all the grants that we fund in terms of community funding is 2.75 for us. Virtually all forms of research going on in the universities at the moment are receiving multiple funding. To come back to the point about the indirect/direct thing, if you are familiar with contra-funding arrangements between universities and the NHS, if we were charged for all indirect costs, but also in supplying teaching, and it is a very substantial resource, we would just be supplying other things without anything in return.

Mr Jones

466. Would you be more willing to support the infrastructure and equipment used for your funded projects if the universities' accounting methods could place a real value on the extent to which they were being used?

(*Professor Jack*) We would like the universities' accounting methods to be more transparent because it has been a concern to the Trust that there are some universities, of which Professor Edwards' university is one, which are quite transparent and you know exactly how much of the HEFCs money is going to the individual researchers whereas in other universities it is quite opaque. That is just a desire for transparency. Our basic position, as I think we have made clear, is we feel we have the choice to not fund in the university system and we do not even have to fund in this country. Of course that is an apocalyptic sort of note and it is not meant as a threat. It is just to draw the attention of this Committee to the fact that we are completely free in our choices. Inevitably we will have a fiduciary duty as Trustees to look for the best deals because our objective is primarily to fund the best medical research we can in the most cost effective way. As those of you who have followed the discussion by Sir Robert May recently in "Science" and some of the discussion from our policy research unit will know, the UK university system is an extremely cost effective way of doing research.

(*Professor Edwards*) I think one of the important points to make, and you discussed it earlier with the AMRC, is the question of a partnership. We regard research in this instance as a partnership with a university and it should also be a partnership clearly with the Government. One has to ask what is each partner actually putting into this. If you come to us and you say "as a Government, the Government wishes to withdraw from this and does not wish to be part of the partnership" we would find that extraordinary. When one looks at the amount of money one is actually talking about that is coming in from the charity sector, I think the Government should be incredibly supportive of this. Bob May's article was remarkable. What he did was to use numbers of citations and to relate them solely to Government-funded research and to say that everything was wonderful. He did not recognise the vast amount of money that is coming from outside the Government sector. That is fatally flawed as a piece of logic.

(*Professor Jack*) He now acknowledges that about 60 per cent of civil R&D funding is supplied by the Government and of course quite a bit of the rest is charity and EU. If you go to other G7 countries and look at their examples of how much government funding is going into the university sector in civil spend then the other one with major charities is the United States. Instead of 60/65 per cent for the UK, in the States 86 per cent of the total research funding comes from the government. In those other G7 countries where charities are not well established, like Italy, France and Germany, well over 90 per cent of the funding is government funding. The Government in this country is already getting an extraordinarily good deal by these alternative sources of funding. If it withdraws from partnership then I do have to draw the attention of the Select Committee, in terms of the proposals we hope it will make to the Government, that we have negotiated deals with four other overseas governments in which we have got very, very generous terms, terms that are completely different from the ones that exist in this country.

Dr Jones

467. If I could just wind up. You say that you respond to applications for funding; could you tell us what proportion of the applications you actually fund and perhaps I should also add to that the proportion of the applications that you would like to fund? In taking your decisions on which projects to fund, do you take into account the infrastructural set-up, if you like, of the group looking for money? Are you getting an increasing amount of applications from abroad that are competing with applications from this country?

(*Professor Jack*) Yes, indeed. We have to restrict our eligibility criteria for applying otherwise we would be absolutely flooded from overseas. We have particular ways of doing our overseas funding. With respect to the success rate for funding, it has gone down a great deal in the last decade. It was very high. It was over 50 per cent but now it is down at about 25 per cent. There is no doubt, I am sure Professor Edwards will confirm this as well, on the different panels and funding stream outlets that we sit on, there is a great unhappiness that we cannot fund more.

(*Professor Edwards*) I think it is also important to point out to you, of course, that we are extremely worried about the potential consequences of changing the MRC funding because the MRC is having a review of its funding, particularly in relation to project grants. I think one of the Trust's fears is that we will effectively become the major source of project grant funding in the UK, in fact in many ways I think we are already. Our worry is the way in which the MRC is starting to ring-fence funding is potentially something which is quite worrying for us because more and more people then turn to us as the first possible source of funds for their research.

Mr Beard

468. Just going back to the point Professor Jack made, is the decline in the proportion of funding due to the quality of the projects or is there a large number of projects and not enough funds for them?

(*Professor Jack*) I think the Research Assessment Exercise has undoubtedly generated a lot of increased research activity and improved the quality.

Chairman

469. Thank you very much. I think we have finished our questions now. If there are any points you would like to make please feel free to do so.

(*Professor Jack*) I think there is one major point that the Trust would like to make because it is a great concern of ours and it is something we felt was an extremely disappointing feature of the Dearing Committee's recommendations and that is related to issues of training, career structure and salaries. The

[**Chairman** *Cont*]

Dearing Committee on training at the doctoral level simply made a gesture towards the Harris Report. We believe that doctoral students should be trained in excellent places. There is an extraordinary feature of laxity about where people are allowed to do PhDs in this country. If you take comparability with the United States, where there is about five times the population and a very large higher education sector, there are only 220 universities which are allowed to award PhDs. So roughly speaking that would come to about 40 universities in this country. That was a point that we made to Dearing and it was not picked up in the report. Government-funded doctoral studies are just three years, but we believe it should be four years. You may know we do a four year scheme because it is now our belief that three years following the undergraduate degree is not adequate. We believe it should be done in good labs and done for longer and there should be further teaching components in it. That is exactly what we have implemented in our various four year training schemes that we have scattered around the country. Career structure for researchers is plainly something that the Government, the research councils and we hope you will join us in recommending to them that really does have to be addressed, that it is really a very insecure career for researchers. The final thing is the salary structure. I just think that it is a great shame that as part of the reduction in funding where the Governments of the past have led the way, in the last 25 years the salaries of university employees and researchers, because the two are linked within the university sector, have gone down by half compared with the national average wage and have barely kept up with inflation. Although clearly that is not something where we would expect any rapid remediation, we do hope that in the longer term view of the future health of research in this country salaries, careers and training will all be addressed.

Dr Jones: Thank you for that. I think Dearing did put a marker upon that in terms of the amount of funding he was recommending. He did not take it into account although he did specifically state that was the case. Thank you very much for making that point, being married to an academic. Perhaps I should declare an interest! Thank you very much, it has been a very interesting session.

Examination of Witnesses

PROFESSOR ALISTAIR MACFARLANE CBE, Fellow of the Royal Society, PROFESSOR COLIN WEBB, Fellow of the Royal Society, and DR PETER COLLINS, Head, Science Advice Section, The Royal Society, were examined.

Dr Jones

470. Can I welcome you to this session of the Select Committee. As before we will launch straight into the questions and then there will be time at the end if you want to make any points that we have not covered. If I could start off; I understand that the President of the Royal Society has suggested that we should set a target for expenditure on research as a proportion of GDP. What would be an appropriate target and over what period should it be achieved?

(*Professor MacFarlane*) I think the appropriate target would be one comparable with other G7 countries, say America, Germany and France. To achieve it I think it would be realistic to have a period of, say, three to five years.

471. What do you think will happen if we do not move in that direction?

(*Professor MacFarlane*) The general view of the Society is that if there is to be a continuing restriction on funding for research, then, in order to maintain the excellence of the quality of the research, which we regard as being paramount, one would have to bite the bullet and go for a lesser volume of research while maintaining the quality. This concentration of research resources has already started and it is imposing very severe strains on the system as a whole and we have given some consideration to the nature of these strains and what might be done about them.

(*Professor Webb*) I think there is a feeling that Sir Robert May's analysis of the science base through the publications reflects the situation of investment some years ago, not the current situation. If we are not careful the future may well see a downturn in that kind of excellence.

472. Would you be concerned that the actual size of the GDP might be affected itself if we do not take action?

(*Professor MacFarlane*) I think in the longer term that is the case, yes. As my colleague has just said we are seriously concerned about the erosion of the infrastructure which has been progressive and we are also concerned not just with the funding which flows from the research councils but the other leg of the so-called dual support system which flows through the funding councils. There is reason to believe that as the general pressure on research funding increases on both of these legs of the support system that an increasing proportion of the funding councils' component is being used not for the purposes of doing speculative research or long range research but simply to prepare increasingly for funding applications to those very limited sources of money which are now available. I asked a colleague in a major university if he could roughly quantify this and he said that in his university something like 85 per cent of the money that could be notionally allocated as coming in on the Funding Council route was being consumed in considering and making applications for research rather than doing research and he put it at about 15 per cent for old-fashioned sit-in-the-corner-and- think or work-in- the-laboratory research. The squeeze, if you like, is having unintended consequences and it is not accurate to

[**Dr Jones** *Cont*]

think of the component notionally called the Funding Council component of research as wholly going into research.

473. So we are getting less and less value for money, for the money that we do spend?

(*Professor MacFarlane*) Indeed. If you look back over the historical record, say to 1980, where there was a ratio of about four to one in these two quantities, it had dropped to about two and a bit to one before the large tranche of money was switched from the funding councils to the research councils. Although we do not have any more recent figures it must have dropped, I would think personally, to less than one to one now.

(*Dr Collins*) That decline from four to one to two to one happened within the space of ten years during the 1980s. It is not a new problem in the sense that it has just been uncovered in the last two years but it is something that has grown very quickly and it has fundamentally changed the nature of the dual support system through which we support creativity and not just projects.

474. Is this a function of the fact that there are all sorts of different schemes for people to bid for funds? Has that made it more difficult?

(*Professor MacFarlane*) It is certainly the case that there are many sources of funding for which people can apply but that in itself has the insidious consequence, that a quite extraordinary amount of time is consumed in making unsuccessful bid applications.

(*Professor Webb*) One of my colleagues refused point blank to join me in making an application for one of these types of grants simply because he spent the whole of the last three summers doing it unsuccessfully. It is rather like a spot the neutrino competition. The success rate on some of these grant schemes is very, very small.

475. What could you do about it?

(*Professor MacFarlane*) In my personal view, and this is also the Royal Society's view, the health of the research activities at universities is critically dependent on the continuation of the dual support system because it is absolutely necessary to make an efficient and good use of public monies. It is a consequence of that that the research councils are mission driven and that is absolutely proper. Furthermore, the research councils work in an extraordinarily effective way. The reason you need the dual support system is that you need a component of research which is speculative, which can go against prevailing fashion, which can make people able to anticipate developments which they think will happen but are not yet, if you like, in the minds of the Research Council. Coming down on the train I was reading "Perfect Symmetry", which is the book about the discovery of the C60 and other molecules and I was struck in this context by the fact that when Professor Sir Harry Kroto was quite desperate to do some simple measurements which he knew were about to be done in Germany, he was unable to do them because he had not got a particular piece of apparatus. The reason he had not got a particular piece of apparatus was that he had four successive research grants turned down. This was long before he became a Nobel Prize winner. The argument would be that if he had been working in a so-called well found laboratory then the relatively straightforward piece of apparatus which he desperately needed to get on a hunch—a mass spectrometer—would have been available. To repeat, the dual funding is, in our view, crucial because it allows people to do unstructured long range research. It also, and this is extremely important in the present circumstances, allows young people to start. When the Research Council system is in full glory, so to speak, it is relatively straight forward for a very well established laboratory to be reasonably well supported on the Research Council side but it is quite extraordinarily difficult for young people to start. One of the traditional ways in which the dual support system worked was it allowed young—in the research sense—people to start. Not only that, it allowed them to break the inertia effects of the laboratory which tends to keep on doing what it has proved to be successful. I think it would be no exaggeration to say that the dual funding system at the moment is on its knees. When the Society and other people argue passionately for the continuation of the dual support system it is not just money that they are arguing for in an absolute sense, it is this fundamental structural aspect of getting some degree of freedom, flexibility, into the system. That is what is crucially important. If the money were to be reduced in an absolute amount for whatever reason we would still feel that it is necessary to restore the balance between these two legs of the support system.

Dr Jones: Thank you.

Dr Turner

476. How much faith do you have in the accounting efficacy of the percentage of our GDP which we are currently credited with as spending in this country? I ask this because I have a sneaky feeling that it is effectively being overstated even though it already compares unfavourably with other G7 members. Do you have a view on that?

(*Professor MacFarlane*) There are various ways in which you could get an absolute view on that. I think it would be fair to say that if you want the Society to look at getting hard figures that is something we would be prepared to do. There would be two straight forward absolute comparators. One would be the degree to which laboratories in comparable activities were funded, the quality of the laboratory equipment on a subject by subject basis adjusted for the volume of research that is going on. The other thing which I think any reasonable university administrator should be able to do, despite protestations of difficulty, is that it should be reasonably easy to work out how much time the staff are actually spending on doing research and then to make a comparison.

(*Dr Collins*) I think it is probably fair to say, if I interpret what is behind the question, I would not stake my life on the last digit in the numbers published. That said, this OECD data that we are using, it is roughly as good as you are going to get given that you are talking about the ratios of two extremely large numbers. If you assume that the inaccuracy is constant from one year to the next then the trend is something that is of interest and the

[**Dr Turner** *Cont*]

comparison between the trend for the UK and the trend for other G7 countries is certainly one that ought to be borne in mind by Government and other policy makers. I would also add there was a Select Committee report, I think it was this Select Committee but I may be wrong, on definitions of R&D which was attempting to tease out just how much weight one could place on these numbers. If you use them as broad guides to policy making rather than anything terribly precise then you will be on safe ground.

477. Whatever the exact numbers are I think we all agree that there is under-funding. Do you think that this is predominantly a feature of science-based research or does it affect other areas?

(*Professor MacFarlane*) I am sure it affects all research and scholarly activity. I do not have a feel for research in the humanities but I think a point which is highly relevant is that the increase in technical sophistication which forces up costs in scientific research also applies in humanities and social sciences. There is some absolutely excellent work going on in these areas which makes very imaginative and effective use of modern computing technology. I imagine the pinch is being felt at least as severely in those areas as well. I would think it would be a generic phenomenon.

Mrs Spelman

478. We have talked a bit about infrastructure; this is difficult. How urgent do you consider the problem of infrastructure under-funding?

(*Professor MacFarlane*) I think it is fair to say that it is chronic and, therefore, urgent. In Dearing, of course, there is a quantification of this, to rebuild the infrastructure. I copied this out of Dearing. The estimates were £350 million in 1989-99 and £565 million in the following year to make up the infrastructure and to invest in new equipment for teaching. These are enormous sums of money. I would prefer to argue that these estimates indicate the urgency rather than give a precise quantification.

479. It is difficult to do that. Is the full funding of Research Council projects the only acceptable solution to the problems regarding funding for infrastructure? If, as you argue, the problems have arisen because Funding Council support has been inadequate, would it not be better to increase their contributions?

(*Professor MacFarlane*) Yes. Put simply, a research university is effectively being forced to subsidise out of its other scarce resources Research Council research if it takes on a grant for which an appropriate overhead is not being paid. If, as has been estimated, you need to increase the overhead from 45 to 60 per cent that must mean that under-funding is being met from other sources. I would say we could be talking about 15 per cent of the individual piece of research.

(*Professor Webb*) You see it in the squeeze on library facilities and those things which do not easily come with Research Council grants because they are part of the general infrastructure of a good university and yet you see cancellations of journals and so on going on in many universities simply because that is one of the places where you can make some economy but really it is pinching in the longer term.

480. Would this still be acceptable if the long-term consequence was a 25 per cent reduction in the volume of the research funded by the research councils as Sir John Cadogan suggested?

(*Professor MacFarlane*) That would be the best of several evils, if you like. To return to what I said in response to the first question, what would enormously concern us is if there were a sudden deterioration in the quality of the research. University people by and large are very fair minded and the ruthless concentration which might be the price that we have to pay for excellence would be very difficult to achieve. I think it would be true to say that faced with the stark necessity of not having an absolute diminution in research with the highest international quality, that sort of volume of reduction would be the lesser evil.

Mr Turner

481. If you are forced down the road of volume reduction does it worry you that if you take this too far you drop below the critical mass of range of research capacity or subject capacity in the country which would really render the whole exercise unviable?

(*Professor MacFarlane*) Yes, without question. There are certain areas, particle physics and astronomy for example, where the critical mass can be generated by international collaboration but there are other areas which, if you like, are laboratory intensive where the critical mass has to be sustained in an individual laboratory. When I referred to a concentration I was not just thinking of concentrating the financial resources, I was thinking of concentrating the human resources, building a number of laboratories quite possibly involving regional collaboration. Our view is that part of the maintenance of the critical mass could be achieved by having first rate laboratories in certain geographical areas and having staff who are research active in related geographical universities all concentrating their research in those laboratories. I think the Society's view would be that it is necessary, and indeed we have advocated, that careful consideration should be given to regional organisations of research but nevertheless there will come a point where if you have to ruthlessly concentrate from a very limited resource you will drop out of certain areas at the highest international level.

Dr Jones

482. In relation to that, obviously a lot of research funding in this country comes from the medical charities. Are you concerned that gives a distortion in the types of research that we are doing in this country? What would be the effect of a further reduction in the volume of publicly-funded research?

(*Professor MacFarlane*) That is difficult to say.

(*Dr Collins*) The Society obviously welcomes any source of money going into basic research and if that happens to be predominantly in one area that is the way it is. There is clearly a very strong appreciation

[**Dr Jones** *Cont*]

of all the charitable sources and indeed all the other sources that are available. I do not think we have a particular view that such a per cent must be allocated to each particular field, and if we had that view we would have to be constantly changing the view anyway as the opportunities open up. We are very conscious of the unpredictability of basic research and the danger of saying we will not be in this area or that area. It means that we do not pick up what is happening until it has already been happening for two years, everybody else has noticed and we have not. We are conscious that if you take concentration in disciplinary terms too far you will end up failing to notice the exciting things that are happening elsewhere in the world. You have to maintain your network and that means you have to maintain people active on a wide front.

(*Professor Webb*) If I could just express a personal view because I do not think the Society has a view on this as a whole. One of the things that happens when you starve an area of physical sciences of research funding to do experimental work is that increasingly people turn to theoretical work. It is something you see in developing countries and countries which have problems sustaining their research base. What happens then, I think, is it fails to generate those advances which can lead to economically exploitable, commercially exploitable things and you do not get the hardware development that is the basis for engineering companies and so on, you tend to get theoretical papers which are scholarly but are not actually going to mean money for the country.

483. Is there also an issue here about attracting young people into physical and chemical sciences, engineering?

(*Professor MacFarlane*) As Professor Webb has just articulated this is, in fact, the Society's motto: *nullius in verba*, which loosely translated might mean "do the experiment".

Mr Beard

484. You have suggested that part of the problem is an imbalance between the budget of the funding councils and the research councils. Would you be in favour, therefore, of shifting some resources from the research councils into the funding councils to make this balance good?

(*Professor MacFarlane*) If I could put it in a slightly different way. I would like to see the balance of the dual support system restored. The only effective mechanism for administering a dual support system is via the funding councils and, therefore, what you say would follow. In other words, I am rejecting the creation of any new route for the dual funding system.

485. Have you any feel for what the extent of the swap that would be necessary would be to bring this into balance?

(*Professor MacFarlane*) This is only the basis of one consultation with a colleague in a major research university. He is a person in charge of budgetary matters. If it is true that only 15 per cent is actually going on to speculative research then in very, very round figures something like an 80 per cent shortfall would seem to exist at the moment. In other words, that bit of the dual research funding system which should go to creating well found laboratories, supporting speculative research, has been diverted into, if you like, directly supporting the other leg. They are seriously out of balance. I think to give an accurate qualification would require some careful study but that would be very well worth doing. If you wanted me to personally quantify the shortfall on the Funding Council side I would put it at about 85 per cent of the current volume.

486. The Royal Society has expressed reservations about the revolving loans scheme that the Dearing Report proposes. Would there be any circumstances in which you would see changing the Government's attitude towards loans and grants or earmarking particular loans as an attractive proposition?

(*Professor MacFarlane*) In a discussion on this earlier today it was observed that the Royal Society does not believe in perpetual motion! We would not see the rotating fund, if you like, continuing to rotate! Basically amongst all the people we have talked to, and we consulted nearly 150 Fellows on their views on various things, there was no support for this proposal at all. That should be taken as a sceptical view. It would be wonderful to have a fund like this but the scepticism stems from wondering what on the other side, the industry side, they would see themselves as getting out of this. I think we simply are baffled about how this would work and sceptical that it would work.

(*Dr Collins*) Certainly, Chairman, the message we have had from our industrial contacts is that putting money into an unstructured pot where you have no control over its destiny even, as it were, first time round is not going to be attractive to any reasonable business man.

Dr Jones

487. In view of the make-up of the Dearing Committee how do you think this proposal came to be suggested in the first place?

(*Professor Webb*) I am baffled.

Mr Turner: This is science and technology here, not speculation!

Dr Kumar

488. In your submission you accepted the need for greater selectivity in the funding of research. Would it be right to assume that the Royal Society agrees with Baroness Blackstone that there should be fewer people studying science in universities? If you do, what consequences would such a decline in student numbers have on the long-term future of our science base? Comment?

(*Professor MacFarlane*) I think our view is more complicated than that. The view that we do express quite clearly is that the system at the moment is producing the number of highly specialised scientists and engineers which industry needs so we see no need to increase the number of people going to the highest level of specialisation. On the other hand, we do believe very firmly that a broader based science education gives you very good preparation for the modern world. We are in favour of the Government's targets, that is to say further expansion of tertiary

[**Dr Kumar** *Cont*]

education, and to expand the generalists in science. We also feel very strongly that as you increase the volume of output it should be diversified over the spectrum which is needed to fit the needs. One of the great needs in industry is for technicians of the highest quality. The demands of modern science based industry, and indeed very wide tranches of industry these days, requires scientific training up to graduate level. I feel not that we should diminish the number of people but that we should shift the balance, we should give them courses that are more appropriate to the needs which the country actually has rather than a linear extrapolation of what exists at the moment.

489. Does that mean you agree with Baroness Blackstone or you do not?

(*Professor MacFarlane*) We do not agree that there should be an absolute diminution in the output of people trained in science. We do agree that there is no need to increase the highly specialised output. There is a need to redistribute the numbers so that we get better trained technicians and more people with a broader understanding of science.

(*Dr Collins*) We are positively delighted that there are many science graduates who pursue careers outside scientific research.

Mr Turner

490. Am I right in thinking that Baroness Blackstone is not a scientist?

(*Dr Collins*) I do not know.

Dr Kumar: No, she is not.

Dr Jones

491. She shut the physics department in Birkbeck. We heard a little earlier from Wellcome that they feel the PhD should be four years; what is your reaction to that?

(*Professor MacFarlane*) Our belief is that the PhD should have a structured element of research training and, if you like, should be more along the lines of the American model than the British model. Given that, it will put very great pressure on the system to produce work to the quality which is necessary to achieve in three years. It is my personal view that a three year PhD is still feasible given that the nature of the degree is properly appreciated. Speaking personally, many supervisors have unrealistic aspirations for their PhD students. A personal view is that it is still feasible to have a three year PhD which contains a very useful component of research training. Again expressing a personal view, if it was necessary to increase the length of the PhD to four years in order to get a good research training then that is a price I personally would pay.

(*Dr Collins*) In some disciplines we have spoken about a seven year envelope between undergraduate and doctoral work. That recognises there are several different ways in which you can spend your seven years but beginning to end that is the amount of time you need in quite a lot of scientific and engineering disciplines.

492. So there could be more structured research at an undergraduate level?

(*Dr Collins*) There are all sorts of models. The M.Res comes in there at some point as well.

(*Professor MacFarlane*) It could be four plus three or three plus one plus three, or whatever.

Mr Jones

493. Dearing proposes the creation of an independent Advisory Council on National Research Policy. Why is there a need for this? If it were to be set up, what would be the advantages and disadvantages of including international representation on it?

(*Professor MacFarlane*) I think it could be very advantageous if its recommendations were made public. I think the Society's view is that it would support it if, and only if, its recommendations were made public. Its value would be that it would reflect a broad spectrum of opinion, it would reflect how the country is seen to be performing *vis a vis* other countries, it would reflect what industry thinks of what the research system is doing and so forth. It could also give a very important independent view of how to resolve some of these extremely difficult problems that we are currently discussing. We do not see the advantage of an input which does not, as it were, feed the public debate.

(*Professor Webb*) I think that is correct. A greater public debate and an awareness of policy issues in science amongst the public at large can only be a good thing. If it hopes to promote that and it is transparent in its dealings then it would be worthwhile.

494. Are there any other changes that you would like to see in the way in which the Council for Science and Technology operates?

(*Dr Collins*) I do not think we know very much about how it does operate, that is our problem.

Dr Jones

495. We did have the suggestion that its membership was not public, but that is not actually the case.

(*Dr Collins*) It is published in Hansard and elsewhere but that is all that is public. I think at one level we are up against this deep seated feeling that advice to ministers is confidential and somehow what the CST does is to advise ministers. My personal view is that there are several logical flaws in that statement, one of which is the fact the CST's job is to advise ministers. I think the CST's job in a way is to provide public wisdom on the main things that we need to be worried about. If that wisdom is the preserve of ministers then after a while one begins to wonder, not so much what is going on, but in fact whether there is anything very much going on at all.

496. The OST claims that more openness leads to greater bureaucracy, as happened with ACOST. How would you respond to that? How would you get over the problems that existed under the ACOST system?

(*Dr Collins*) The Royal Society finds it to be possible to be open without being bureaucratic.

497. In terms of the problems that did exist, how would you overcome them?

[**Dr Jones** *Cont*]

(*Professor MacFarlane*) Taking a slightly broader view, that is to say looking towards the future, there will be many, many problems bearing on fundamental research in which the public will have a legitimate concern: food science, BSE, decommissioning military weapons, nuclear warheads and so forth. Anything which can give an informed public debate, put things in a broader and broader context, can be only beneficial. There is still a feeling amongst many people that science is an arcane and threatening activity. This is one reason why we would like to see much broader scientific education at the degree level. Giving a personal view, I think that there will be an almost endless succession of matters in the next decade which will greatly concern the public so that scientific research will have been seen to move from an esoteric pursuit of the few to something which is actually vitally important. Openness in all aspects of its advice and pursuance would be very, very valuable indeed.

498. Thank you for that. We have come to the end of our questioning and we have really come to the end of our time. If there are any burning issues that you would like to raise with us then please feel free to do so, but quickly.

(*Professor MacFarlane*) Thank you very much. I would just like, if I may, to reiterate the very serious concern that we feel about the erosion of the research supporting infrastructure and the collapse of the dual support system and also to reiterate that we see an absolute and urgent need to increase the overhead on Research Council grants.

Dr Jones: Thank you very much. I hope everybody here has a good Christmas as well. Season's greetings to you all.

WEDNESDAY 21 JANUARY 1998

Members present:

Dr Michael Clark, in the Chair

Mr David Atkinson	Mr Nigel Jones
Mr Nigel Beard	Dr Ashok Kumar
Mrs Claire Curtis-Thomas	Mrs Caroline Spelman
Dr Ian Gibson	Dr Desmond Turner
Dr Lynne Jones	Dr Alan W Williams

Memorandum submitted by the Department for Education and Employment

INTRODUCTION

1. The Department for Education and Employment welcomes the opportunity to present a memorandum on its response to the research recommendations of the National Committee of Inquiry into Higher Education (the Dearing Inquiry). This covers research carried out by higher education institutions in England only. Government policy on higher education in Wales is a matter for the Welsh Office.

2. Following the publication of the Inquiry's Report on 23 July 1997, the Department began consultations on all its recommendations, including those on research. In the light of over two hundred responses received, we have been co-ordinating a comprehensive Government response to the Dearing recommendations with a view to publishing it alongside or shortly after the forthcoming White Paper on Lifelong Learning. This will include our response to the research recommendations, although a substantive response to the recommendations which concern research funding will have to await the outcome of the Government's comprehensive spending review. We shall let the Committee have a copy of the response as soon as possible.

3. In the meantime, this memorandum answers the specific questions which the Committee has put to the Department.

Is it essential that every university in the UK has a research capability and why?

4. The Department believes that research makes an important contribution to higher education. The conduct and results of research support and enrich teaching at the highest levels, both undergraduate and postgraduate. As the Dearing Report recognises, it is therefore important for academic staff in all higher education institutions to undertake research or scholarship in support of their teaching: this ensures that they remain close to the frontier of their subject and adds to the authority and vitality of their teaching. Under present arrangements, the power to award research degrees and confirmation by the Quality Assurance Agency that the institution has maintained the standard of those degrees over at least three years are normally prerequisites for university status as marked by the grant of a university title.

5. This does not, however, necessarily mean that all higher education institutions should have an extensive research capability or that all academic staff should carry out research aimed at a wider public or train research students. Rather, the Department considers that higher education institutions should have the freedom to pursue a diversity of missions. In some universities, fewer than one in four academic staff were entered for the 1996 research assessment exercise and they were often concentrated in a minority of the 69 disciplines assessed. Indeed, some higher education institutions may have virtually no research capability beyond the scholarship needed for academic staff to keep up with new developments in their subjects. But, given the institutional autonomy of universities and colleges, we do not consider that it is the role of Government to determine which higher education institutions should develop or maintain such a capability. The Government's role is rather to set the framework within which public funding for research should be allocated.

6. Given the other pressures on public spending and in particular the education budget, the Department recognises that the public funds available for research are necessarily limited and unikely ever to be sufficient to fund all the research that might be conducted within the higher education sector. We therefore consider that it is right to allocate research funding selectively and to concentrate it on departments which are likely to produce over the long term highest quality in terms of research output. This means that inevitably some higher education institutions will be able to maintain a more extensive research capability than others.

7. The Department has therefore asked the Higher Education Funding Council for England (HEFCE) to continue allocating its research funds selectively. At the same time, however, we wish to see an appropriate balance in funding between departments with an established research record and those which show potential but have yet to realise it fully. We have therefore asked the Funding Council to bear in mind the dangers of over-concentration of funding which could lead to the withdrawal of support from promising research and talented researchers in other institutions. The Department will follow with interest the level of selectivity that the Funding Council applies in future research funding allocations and the outcome of the higher education funding bodies' current consultations on the future of research assessment.

8. The Dearing Report suggested (in paragraph 11.65) that universities and colleges should in future enter departments for research assessment only if they believed that their research was of a quality that equated to levels of national excellence and showed some evidence of international excellence—ie that they would attract at least a 3a rating on the 1996 scale. The Report went on to propose that any department which entered the RAE but achieved a 1 or 2 rating should receive neither RAE funding nor alternative funding which the Committee recommended should be allocated to departments on a non-competitive per-capita basis to support the scholarship which underpinned teaching.

9. The higher education funding bodies' consultation document on research assessment specifically includes the question of whether any funding should be separately available as an incentive to departments not to participate in the RAE, as the Dearing Report recommended. In response to our consultations on the Report, we have received a number of comments that it would be inappropriate to describe this as a fund for scholarship, since all academic staff should be engaged in scholarship. Nevertheless, we recognise that a real issue remains over the selective funding of research and whether the RAE in particular may encourage some departments to undertake research when they would do better to focus their energies on teaching.

10. The Department does not, however, accept that only a certain number of universities should be allowed to enter any research assessment. Whilst it remains difficult for many institutions to show research excellence across a wide spectrum of disciplines—particularly in science and technology as well as the social sciences, arts and humanities—a substantial proportion have demonstrated research excellence in some subject or another. One of the strengths of the current research assessment exercise is that it allows excellent research departments to be recognised and funded even in institutions that do not have a strong research profile across a range of subjects.

11. Thus, while some institutions did not show strengths across the board in the 1996 RAE, 120 or so institutions in England had at least one department whose assessed research was judged to merit a rating of at least 3a—that is, its research quality largely equated to levels of national excellence and showed some evidence of international excellence. Nearly 80 institutions (including specialist institutions) in England gained in at least one of their departments a rating of five—ie reflecting research quality that equates to levels of international excellence in some sub-areas of activity and national excellence in virtually all others. This is an impressive achievement; and we would not wish to see such departments ruled out from maintaining and developing their research capability.

To what extent does the Dearing Report provide an accurate assessment of the problems currently facing university research and researchers?

12. The Department believes that the Dearing Report offers a wide-ranging and valuable assessment of the problems currently facing university research and researchers. This is a view shared by the one in four respondents to the Department's consultations who commented on the research recommendations. They generally welcomed the Committee's identification of the problems that needed to be addressed. There was in particular wide agreement that there had been under-investment in the research infrastructure.

13. The Department accepts that the growth since the late 1980s in the volume of research undertaken by universities has led to strains on the dual support system, as HEFCE research funding has failed to keep pace with that growth. The Dearing Report quotes estimates of the size of the funding gap as ranging between £137 million an £720 million. These figures have been drawn from a report prepared by Segal Quince Wicksteed for the Committee of Vice-Chancellors and Principals (CVCP) and the HEFCE. We do not have an alternative estimate to offer but note that these estimates depend crucially on certain assumptions, notably the time spent by active researchers on research, both sponsored and non-directed.

14. The Department agrees with the Dearing Report that part of the problem lies in the difficulties encountered by universities in recovering the full indirect costs of research sponsored by external funding bodies. Whilst good arguments for recovering less than full costs may exist in the case of collaborative research, they do not do so in the case of contract research. Nevertheless, it may be in an individual university's interest—though against all universities' longer-term interests—to accept a lower rate of cost recovery, especially when the university wishes to pursue the particular research as part of its own wider programme: it has certainly been in the contractor's immediate interest to secure as low a price as possible for research. As the Dearing Report recognises, the lack of clarity about the full costs of research also hinders the recovery of full costs.

15. The resultant strains on the university research infrastructure are most visible in the lack of investment in up-to-date equipment and the backlog of building maintenance. The Dearing Report referred to a survey estimating that £474 million would be needed over the next five years to bring equipment in UK universities up to a level which would allow it to carry out the volume of research expected to be funded and to meet associated facilities and operating costs. This estimate stems from a survey carried out by research groups at the University of Manchester for the CVCP and Higher Education Funding Councils. This survey provides a useful analysis, although it remains difficult to distinguish between essential and desirable needs. The Department has, however, already made a start on addressing urgent needs for equipment for teaching and research by making extra funding available for both 1997–98 and 1998–99. (See paragraphs 23–24 below.)

16. As already explained, the Department supports the need for selective funding of research and for a process to achieve this. We share, however, the Dearing Committee's view that there is room for improvement in the research assessment exercise (RAE) and welcome the higher education funding bodies' present consultation exercise which is aimed at achieving this. In particular, we wish to see an appropriate balance in emphasis between research and teaching in higher education institutions and between competition and collaboration. There is a need to ensure that the RAE does not distort the balance in departments' efforts between research and teaching or inhibit collaboration within and between universities, particularly in the conduct of interdisciplinary research.

17. The Department shares the view of the Dearing Inquiry of the growing role of information technology in maintaining the quality and cost-effectiveness of academic research and the science base in the UK. Networking and electronic library applications are needed to provide researchers with good access to information sources held remotely across the world, as well as super-computing facilities. As research becomes increasingly collaborative and international, so the provision of high-quality networking becomes more important to universities' research activity, as the report of a joint DfEE/HE sector working group on IT in higher education noted last year. In particular, UK researchers need substantial international bandwidth to collaborate to the full with researchers abroad, particularly in North America, and to participate in European-wide research projects funded by the European Union. Securing and financing the provision of sufficient bandwidth remains a substantial problem for the higher education sector.

18. The Department notes the widespread support from interested organisations for the need for new arrangements for funding arts and humanities research and recognises that setting up an Arts and Humanities Research Council would be one possible solution. The Dearing Committee's proposal for additional £25 million in funding would, however, need to be considered against competing priorities within the Government's comprehensive spending review, unless resources can be freed within other budgets.

19. The Dearing Report makes various recommendations on the training of future researchers, the structure of postgraduate degrees and career structures for researchers. The Department considers that these matters are essentially for higher education institutions themselves and their representative bodies to consider, in the light of the Review of Postgraduate Education (the Harris Report, 1997) and the concordat on contract researchers that they have agreed with the Research Councils, charities and Royal Society.

20. While there has been a large measure of agreement with the Dearing Committee on the problems facing university research, there have been more mixed reactions to the solutions that it has proposed to those problems, as the brief summary at Annex A shows. As already promised, the Government will shortly be publishing its overall response to the Dearing recommendations, and the Department will let the Science and Technology Committee have a copy. We shall continue thereafter to co-ordinate follow-up work on the research recommendations with other Departments.

What is the level of priority accorded to research by the DfEE?

21. The Department accords a high priority to university research but is concerned that teaching should attract comparable esteem. As already explained, we share the Dearing Inqury's concern at the downgrading of teaching that can occur when recognition and rewards within—as well as between—universities tend to encourage academics to focus on research assessment as the only or over-riding measure of higher education excellence. We wish to see an appropriate balance in emphasis between research and teaching in higher education institutions and look to the HEFCE to consider how to ensure that financial incentives for research do not lead to the neglect of teaching.

22. That said, the Department believes that universities make an essential contribution to the country's research effort, particularly in basic and strategic research but also increasingly in applied research. Universities have a key role in producing and disseminating new knowledge and understanding, both for their own sake and for their use in developing and exploiting applications and technologies which enhance the UK's competitiveness, prosperity and quality of life. Of equal importance is universities' role in training very highly qualified people who will in future staff not only universities but also research departments and institutes outside higher education: they also thereby help to spread to industry and other employers information, expertise and access to international networks. We thus attach high priority to maintaining and enhancing universities' research excellence so that they can continue to produce world-class research and

increasingly support regional as well as national economies. Their effectiveness in the latter will, however, depend on their success in promoting the applications of higher education in collaboration with business locally and nationally.

23. In fulfilment of our commitment to maintaining a world-class science base, the Department has already taken action to start addressing the financial crisis faced by higher education that has been placing strains on the university research infrastructure. We are making available an extra £5 million this financial year to the HEFCE to support its joint research equipment initiative with the Research Councils and other higher education funding bodies. This is in addition to the £18 million being set aside by the HEFCE for this year's initiative and the Research Councils' contribution, initially set at up to £5 million and now increased by the Office of Science and Technology to up to £8 million. Together with matching contributions committed by industry, charities and other private sponsors of research, this should provide some £60 million of leading-edge research equipment for universities and colleges in England. The joint research equipment initiative will take place annually in future. In addition, the Funding Council will be providing in excess of £30 million a year for three years from 1998-99 to support a research laboratory refurbishment programme.

24. The Government has also taken the decision to require contributions to tuition fees from students in order to provide additional money to improve quality, standards and opportunity for all in further and higher education. It will take time for these proposals to generate more additional money. Nevertheless, the Department has already announced a package of measures which, taking account of the income from tuition fees, will allow an extra £165 million to be spent on higher education next year. As part of a commitment to quality in higher education, this package will include an additional £125 million for universities and colleges in 1998–99. This is intended to help universities and colleges to maintain and improve quality and standards, and to make a start on the backlog of maintenance that has built up, as well as upgrading equipment for both teaching and research facilities. Instead of the severe reduction of 3 per cent in universities' unit of funding in 1998–99 planned by the previous Government, this package meets the Dearing Inquiry's priority that the reduction in university funding per student should be no more than 1 per cent, while allowing extra for investment in the infrastructure. It will be for the HEFCE and ultimately universities and colleges themselves to determine how much of the new resources to spend on research.

25. Decisions on higher education funding for 1999–2000 and beyond have not yet been reached and will have to await the outcome of the Government's Comprehensive Spending Review. But the Department will bear in mind the importance of sustaining the infrastructure needed to maintain and enhance university research, and the Government has already committed itself to making savings from its new funding policy available to higher and further education.

The priority accorded to research by the DfEE in its own policy and decision making

26. In addition to its policy responsibilities for the funding of research undertaken by universities and colleges, the Department has another interest in ensuring that the necessary infrastructure exists to support high-quality research in higher education institutions, including appropriate professional training for junior researchers. The Department is itself a major user of research evidence in the development and evaluation of its policies and programmes. We directly commission policy-related research from academic institutions, research institutes and other research organisations. The Department's annual budget for commissioned research is some £5 million, and some additional research is commissioned from other budgets. Research is also commissioned by the Employment Service, the Office for Standards in Education, the Qualifications and Curriculum Authority and the Teacher Training Agency, among others.

27. In addition to our own directly commissioned research, we also seek to draw on and influence the research programme funded by other bodies such as the Economic and Social Research Council, with whom the Department has a Concordat agreement. We are currently sponsoring a review of the funding, organisation, quality and impact of education research in the schools field.

28. Research evidence is used in making major decisions about public expenditure; and it is important that the research is soundly based, meets the appropriate standards of academic rigour and will stand up to critical scrutiny. The development and maintenance of a high-quality research base in higher education, particularly in the social sciences and in areas such as learning technologies, is therefore of key importance to the Department.

CONCLUSION

29. If the Committee would like further information, the Department would be pleased to provide further evidence to the Science and Technology Committee in its Inquiry. We shall in particular ensure that the Committee receives a copy of the Government's comprehensive response to the Dearing Report as soon as it is presented to Parliament and published.

January 1998

Annex A

Responses to the DfEE's Consultations on the Dearing Recommendations on Research

1. Nearly a quarter of the responses to the Department's consultations commented on the research recommendations. They generally welcomed the Committee's identification of the problems that needed to be addressed.

2. There were, however, more mixed reactions to the solutions proposed by the Dearing Committee to the current problems facing university research. The proposal for extra Research Council funding for indirect costs (Recommendation 34: first part) was, for instance, widely welcomed, though respondents mostly wanted to see extra funds to implement the proposal rather than a transfer from the Funding Councils or a reduction in the volume of research supported by the Research Councils.

3. However, amending the RAE to provide non-competitive funding for scholarship (Recommendation 34: second part) proved a controversial proposal. While many respondents acknowledged that adjustments needed to be made to the RAE, it was felt that this was only one of a number of approaches that could be considered. The main representative and funding bodies urged caution before proceeding, and the need to consider other options through further consultation.

4. The revolving loan fund proposal (Recommendation 34: fourth part) was not welcomed by the industrial respondents, who argued that it was a government responsibility to fund the infrastructure. There was also a mixed reaction amongst institutions.

5. Recommendations 31 (postgraduate training), 32 (interdisciplinary research) and 33 (international members of the RAE) were generally welcomed. The HEFCE are discussing Recommendation 32 (interdisciplinary research) with the Research Councils and other HE funding bodies. The HEFCE suggested that the RAE consultation would confirm how far including international members in assessment panels (Recommendation 33) was a practical recommendation.

6. Recommendations 27 and 28 (network services), 52 (clarifying the true costs of research) and 68 (incentives for collaboration) received only a few comments but were welcomed when mentioned.

7. Around one in eight respondents commented on the recommendation to establish an Arts and Humanities Research Council (Recommendation 29). The majority were in support. Some emphasised the need for new funding, and a few commented on which Government department should be responsible for sponsoring an Arts and Humanities Research Council.

Examination of Witnesses

THE BARONESS BLACKSTONE, a Member of the House of Lords, attending by leave of that House, Minister of State and MR TONY CLARK, Director, Higher Education, Department for Education and Employment, were examined.

Chairman

499. May we thank you very much indeed for coming along this afternoon and helping us with our inquiry? You may well have been following some aspects of our inquiry from the evidence which has been published but we could not possibly think of completing this inquiry without seeing you and asking for your assistance. I wonder whether you would care to introduce Mr Tony Clark to us, who happens to have the same name as my brother but who is not my brother? If you wish to make an opening statement, we would welcome that as long as it is a fairly brief one. Otherwise we hope that all the information we want will come out in questioning.

(*Baroness Blackstone*) Thank you very much indeed for inviting me. It is very nice indeed to have the opportunity to be here. May I begin by introducing Tony Clark, your brother's namesake, who is the Director of Higher Education in the Department for Education and Employment. May I then go on to give you a short opening statement. The Government inherited a funding crisis in our universities, as many of you will be well aware. The national committee of inquiry, under Ron Dearing, which was set up with cross-party support, recognised that further improvement and expansion of higher education could not be afforded on the basis of the current funding arrangements. We did move quickly in the light of the national committee's report to address this funding crisis. In July 1997 we

[**Chairman** *Cont*]

announced our new funding arrangements for higher education. These will mean more money for universities and the Government will ensure that savings are used to improve quality, standards and opportunities for all in further and higher education. As evidence of our commitment the funding package for higher education for 1998-99, which we announced in September of last year, provided an extra £165 million for the HE sector, which will enable universities to make a start on the backlog of maintenance and equipment replacement including for research. Further, we are making available an extra £5 million this financial year to the Higher Education Funding Council for England to support its joint research equipment initiative with the research councils and other higher education funding bodies. We have made a small start in addressing the very considerable pressures on our research infrastructure to which Ron Dearing and his committee drew attention. We do take these very seriously indeed, given the important role which research, particularly in science, engineering and medicine—I am a social scientist and I do not want to leave out the social sciences either—plays in promoting wealth generation and quality of life and shall be pursuing them in the context of the Government's comprehensive spending review. May I add that that spending review is not yet complete, therefore I am not going to be able to say today quite as much as perhaps the Committee would like me to be able to say about whether any extra funding for research of the sort that was suggested by the Dearing committee is actually going to be available. I hope that is helpful.

500. Thank you very much; that is very helpful indeed. In fact it has led me very nicely into my first question. You touched on the fact that you recognise the importance of research to this country's competitiveness but may I ask what assessment your Department has made of the importance of university research in contrast perhaps to industrial research to the UK's international competitiveness?

(*Baroness Blackstone*) I do not know that I can give you chapter and verse in terms of any specific research projects themselves into the contribution of university research to competitiveness. This is actually an enormously complex area to investigate and SPRU, the unit at Sussex of which you will be very well aware, would certainly want to argue that it is very difficult to identify with any competence direct contributions which research makes to competitiveness. What we can say is that research in our universities is contributing greatly by raising the standard of understanding of many different processes which you might want to employ in manufacturing industry for example, through the kind of applied research which is done in engineering departments and more indirectly through what happens in university pure science departments. They are also contributing by advancing our knowledge in a whole variety of different spheres in ways which will eventually be picked up and applied to industrial developments, new processes, in a whole variety of different areas. In so far as research in the social sciences is concerned, if we can improve our understanding of how economies work, of industrial relations, of a whole range of different things that one could name, then it will in the long term and in an indirect sense benefit the competitiveness of the UK. If we were to cut back on this kind of research it would be extremely foolish and foolhardy in terms of our position vis-à-vis many other countries which have invested heavily in research.

501. It is easy to ask a question of the type I asked but it is very difficult to quantify it. I did not expect a quantification but you have indicated to me that you and your Department are aware of the contribution research makes and that you are sympathetic to the idea of wanting to continue or expand research, if I have interpreted your answer properly.

(*Baroness Blackstone*) That is right. Perhaps I ought to have added to what I said that research in universities is of course contributing to the future training of both scientists and engineers and that is a perhaps more direct output of investment in our universities.

502. A very important point but I will leave it for a moment because I know some of my colleagues want to come onto that very point before very long. Lord Dearing, Sir Ronald Dearing as he was, in his report said that "... the UK compares unfavourably with competitor countries" in terms of research expenditure and that "... the UK Government makes one of the smallest contributions of the G7 countries" to research. Do you agree with that and if so is it something which you in the new Government would want to attempt to address at some stage when the economy may be right?

(*Baroness Blackstone*) I think Ron Dearing—I am going to call him Ron Dearing rather than Lord Dearing—is right in the sense that the statistical evidence is there. What we have seen is a serious decline over the last 15 or 20 years in the amount of money which the UK spends on research as a proportion of GDP. On the other hand I do know that the Chief Scientist, Bob May—and he has probably already given evidence to you—has undertaken quite complex international comparisons where he has argued that if you look at outputs UK research is doing rather well. He has looked at citations and publications in terms of the impact which British scientific research makes internationally. We should not in any way undervalue that but this is an area where we ought to be spending more money. It is a long-term investment in our future and that links in with what I was saying about its value from a competitiveness point of view just now.

Dr Turner

503. From the point of view of your Department, do you feel any responsibility for your Department to help in this matter and do you feel any urgency in addressing the under-funding of British science in universities, especially given the fact that you have referred to indices which indicate success of British research, but there is an awful time lag in those? That is not current, that is living off past intellectual capital. There is also evidence that that is drying up.

[**Dr Turner** *Cont*]

Do you feel any urgency from your departmental point of view in addressing and underpinning the future of British science in universities?

(*Baroness Blackstone*) I do; very much so. It is very important that any additional funding we are able to provide for our universities to get them out of a financial crisis which I mentioned in my opening statement should provide a substantial part of that additional funding for both direct and indirect support of research in our universities. I say direct and indirect because clearly if we provide additional recurrent funding to British universities, which we have done—we have met the Dearing committee's recommendation that during 1998-99 there should not be further efficiency savings above one per cent, that we have been able to do—that will help the universities from a research point of view because a substantial part of the universities' recurrent funding does go to support research. We also need to see more direct funding in terms of support for equipment, support for research infrastructure generally. It is not very long since I ran a British university, a college of the University of London, so I have some direct experience of seeing just how hard done by many of our science departments are. They are operating very often in accommodation with equipment which frankly from time to time with my previous hat on I felt ashamed of. We have to do something about this. It is very much a high priority for my Department and something we want to do, although it is a joint responsibility that we have with OST and DTI.

Dr Kumar

504. What would be the long-term consequences if the UK Government were to continue to invest less and less in research and development than governments in competitor countries?

(*Baroness Blackstone*) Coming back to what I was saying earlier, what it will mean is that we have fewer highly qualified people who are able to work at the cutting edge, who are able to be innovative, who are able to come up with new ideas, to produce new discoveries that can then have enormous spin-offs from an applied point of view. That is what it will mean if we fail to do this. It will then in turn mean that we will lose out with respect to exports, with respect to the general prosperity of our people. In the millennium, in the twenty-first century, if this country cannot be at the cutting edge, we are bound to decline economically.

Mr Beard

505. In the context of the last few questions, are you aware of the work done in the OECD, which shows a direct correlation between the country's investment in research and its growth rate? Indeed virtually the whole difference between this country's growth rate and some of its European Union colleagues is explicable in that way. Is this fully accepted in the Department? Is this accepted also when you are trying to improve the position?

(*Baroness Blackstone*) You would have to address those remarks to my colleagues in the Treasury of course, on whom in the end we are dependent when it comes to additional funding. As to whether this is part of the culture of the Department, perhaps I should turn to Tony Clark and ask him for his view. It is certainly my view and I accept this. I suspect that my official colleagues do as well.

(*Mr Clark*) We do accept there is a broad correlation of the kind which has been mentioned. It is quite difficult to break this down in terms of where particular funds for research should best be allocated to achieve that growth. That is a further question which needs to be addressed. Perhaps I could also say that there are very clear studies about the relationship between applied research, as one might expect, and economic growth and the success of companies. Part of universities' research is about training young scientists to go out into industry and employment. That is another area, a rather more indirect area, where there is a correlation between investment in research in universities and economic growth.

Dr Gibson

506. You have obviously understood the dual support system for some time and operated within it. Does your Department still believe that is the best system to operate to keep science going to the level you obviously want and why? Why do you believe that it is the best, other than from past bitter experience?

(*Baroness Blackstone*) I must try to put my past bitter experience on one side and look to my present position and the future. Yes, the Department do think that this is the most sensible system for allocating funds for university research. The reasons for this are that if we were to transfer the funding councils' money which is allocated for this purpose to the research councils we would deny the universities first of all the opportunity to help and support many young scientists and indeed others, scholars even in the arts and humanities who may sometimes need support of some kind or another, travel money to visit a library abroad or whatever it might be, young scholars and researchers who might not find it particularly easy to get substantial grants out of the research councils. In any case many, many very talented researchers have gaps between the end of one project and the next when they will not be funded by the research councils and it is important that universities are able to continue to support them whilst there is a gap between completing one project and getting extra funding for the next project. It is also the case that a very substantial number of very highly graded research applications to the research councils do not get funded at the moment, but because there is research funding via HEFCE, some very able people are able to keep doing research, even though they may have failed with an A grade for a particular proposal to a research council to get funding at that particular time. That is a very important reason. The other reason is that there are many indirect costs to research which you will be very familiar with, which it is actually very difficult to be precise about and where it is probably rather wasteful to try to be terribly precise about, where some cushioning of what goes on in terms of the research activity of universities is very important. We will end up with armies of people doing accounts if

[**Dr Gibson** *Cont*]

we try to support all research down to the last tuppence halfpenny through programme and project grants through the research councils. That is my Department's view. It is also the view of the sector, which has come out very strongly in the response to the Dearing committee's report, that people in universities at all levels want to keep the dual support system. I would fight very hard to do so and I hope that your committee will support that position.

Chairman

507. Do you think the OST wants to keep the dual system?

(*Baroness Blackstone*) You are going to be seeing John Battle after me. I must not preempt what he is going to say but my impression from talking to him is that OST recognises that it is sensible to keep the dual support system as it is and not to have a further transfer beyond the one which was made several years ago into the DTI and away from the HEFCE. Can you confirm that is the view of officials in OST as well?

(*Mr Clark*) Yes, I can confirm that is their view in terms of transferring resources. There is of course the Dearing recommendation about the research councils covering a larger element of indirect costs and that is something which the Government are still considering.

Dr Gibson

508. Do you think that Save British Science are way out in the left field when they say the system has collapsed because of inadequate funding from the funding councils?

(*Baroness Blackstone*) One has to allow for a little bit of rhetoric from pressure groups of that sort. I would not personally go as far as to say that the system has collapsed because clearly there is still a great deal of first class research going on in British universities. At the same time I think that it is vitally important that we do increase the funding that we provide. If we fail to do so, we will be wasting an enormous amount of potential, potential amongst the young scientists, young academics, who are raring to get on with high quality research. It will also mean that we will lose out in particular to the United States of America. It will mean that people who graduate with first class degrees and want to do PhDs will end up going to the States, to Canada, possibly elsewhere in Europe and not staying in the UK. They will be doing so, not so much because they might get a bigger grant, but because the research facilities that have been provided, particularly in North America, are so vastly superior to what we can provide. There is already quite a big gap in this respect and I do think it is terribly important that that gap does not get any bigger if we are going to go on doing the job we have to do in training people.

509. Do you realise they are doubling their budgets in certain areas with approval from the Government?

(*Baroness Blackstone*) I do; I do.

Mr Beard

510. Another factor behind what you referred to as the rhetoric is the view that certain funding council money is being diverted to provide infrastructure and therefore depleting the resources which are available for curiosity and speculative research. Therefore that end of the spectrum of research is being denied.

(*Baroness Blackstone*) I am not sure that I entirely go along with that in the sense that I think that research infrastructure is all part of what goes into supporting the curiosity, the speculation, the speculative work, the imagination and you cannot do it in a vacuum. You cannot sit on a cloud, unless you are a philosopher perhaps. You would need to be in your laboratory with that infrastructure to help you develop your ideas. You also need not just equipment but you also need good technicians and you need good research assistants. All of that is part of what goes into, and I count that as part of, the research infrastructure. I do not see the research infrastructure just in physical terms. There is a staffing element to the research infrastructure and that goes into support for that sort of creativity. I understand what they are saying; I can see what they are saying. They do not want scarce money just to go into what might look like bricks and mortar. It is true that the capital allocation for universities has gone down very substantially over the last 18 to 20 years.

Dr Jones

511. It is quite clear from your answers so far that you agree with all the other witnesses that we have heard and all the submissions we have received that there is a crisis in funding of our universities and that ultimately that is going to be to the detriment of this country and economic growth and our competitiveness. The question is: what are you actually going to do about it? We have heard about the extra £165 million next year, but that funding has actually been obtained by changes in accounting practice in terms of the loans and their allocation on a termly basis rather than an annual basis, which has allowed you to grab a bit of money. We have also heard that the funding for the research councils in real terms is to decline next year. Really if we are accepting there is a crisis we have to do better than that, have we not? Do you accept that and what prospects do you hold out that we are going to do better? What amount of resources are likely to come in from the new arrangements for student funding and for fees? Is that going to be sufficient? What level of funding would you like to see and how is it going to be made available?

(*Baroness Blackstone*) Let me just begin with the research councils. You should ask John Battle about that.

512. We will.

(*Baroness Blackstone*) I am not actually responsible for any reduction in funding for the research councils; it is not part of the DfEE's budget. As far as the additional £165 million is concerned, that derives from a complex package of changes not just from a change in the date at which student loans are allocated but also from the introduction of tuition fees, though the amount of revenue we will

[Dr Jones *Cont*]

bring in from that is reduced by the fact that we are providing additional loans. Eventually, as the loans start being paid back—and it is quite soon—the amount of additional funding which we obtain from the whole package will be very considerable. I will ask Tony Clark to give the details of the additional amounts we will receive over the next five years and then beyond, but it takes us to 2015, to very large additional sums, some £1.5 billion extra amounts of money available.[1] We have said right from the beginning that the additional amounts we raise will go into further and higher education. It is important that we remember further education as well as higher education. After all, further education is playing and will continue to play an even bigger role in terms of life-long learning and the provision of education at the technical and intermediate level. Many of the people who may work in support of research either in industry or in universities will be trained in FE colleges; some people who will go back to do reskilling, updating of their knowledge, will go back to FE colleges. I just want to make that point in passing. As far as what we can do beyond 1998-99 is concerned, I am going to have to disappoint you because I cannot say, until the comprehensive spending review has been completed, and you will understand that. I am optimistic and I very much hope that in 1999-2000 there will be further funding again which we will be able to provide for the universities and that some of this will be for research.

Dr Jones: Could Mr Clark give us the figures about what income will be coming in in the next few years? We are talking about a crisis now so it is the next two or three years which really count.

Chairman

513. May I just remind the witnesses that Dr Jones did also ask about any extra funding which might come from the new arrangement of student fees?

(*Mr Clark*) I am not sure I carry the detailed figures in my head but what I can say is that the net savings from the funding package, that is to say the student support package, including the privately paid tuition fees, amount to about £100 to £200 million in the first year, 1999-2000, rise to about £300 to £400 million—I will have to check these figures—in five years' time and then increase quite sharply to the figure Baroness Blackstone has mentioned of over £1 billion by about 2015. The reason why it moves in this rather gradual way to start with and then moves up quite sharply is simply the extra cost of loans in the first few years as we move from a means tested grant regime to a loans scheme. There is an extra cost associated with that. There will be substantial savings looking forward and there will be reasonable savings in the short term.

514. With your permission, Minister, may we ask Mr Clark to drop us a note on this? We do not expect him to have the figures in his head but if he were able to send them to us we should be most grateful.

(*Baroness Blackstone*) Yes. The figures he has just given in broad round terms are exactly the ones I would have given. I think he can be more precise.

515. I think he was seeking to give us something more precise if he had the benefit of a bit of time.

(*Baroness Blackstone*) Certainly.

Dr Jones

516. What sort of proportion of that would you envisage going to FE? Whilst we are talking about £100 million or so a year for the next couple of years, we have an infrastructural crisis which you have acknowledged in your own submission and you also said the submissions you have had are also overwhelming in that view. We are talking about £500 million which is needed now. This is very urgent.

(*Baroness Blackstone*) Yes, I am very aware of how great the need of the universities is for additional funding and additional funding quickly. I have to say that the FE sector was also left in a very difficult financial situation. Some 25 per cent of further education colleges have quite serious deficits. As far as the new arrangements for student support are concerned, where we are in fact asking students to contribute to the cost of their higher education, where their families can afford to do so, it does make a lot of sense for a substantial part of the revenue which comes from that to go back into the universities and that is widely accepted.

Dr Williams

517. I am going to ask about the research assessment exercise. Given that finance is very tight, is there an argument for being more selective about where the research money goes and whether there should be a cut-off point, let us say at grade 3b, so that any department 3b or above receives funding but any department which scores only 1 or 2 has no funding and concentrates on teaching?

(*Baroness Blackstone*) The funding council is consulting the universities about both the last RAE, analysing the results of the last RAE, and looking at what they produced in terms of resource allocation and consulting about what the next one should look like. I should really not preempt that consultation process. What I say is in a sense a personal view because this is very much a matter for the funding council and the sector, for the universities, to agree a sensible way of funding. What I would say in general terms is that it is right to be selective but it is wrong to be over selective. My own view is that Britain needs and deserves more than three or four or five research universities. It is very important that we sustain good quality research in a substantial proportion of our universities. At the same time it would be foolish to spread what money we have around equally; that would be a nonsense. We want a degree of selectivity but more than five research universities. What ought to happen is that we should continue—this is going to sound rather conservative—on fairly similar lines to the ones we have been working on up until now. The RAE has been improved over the years which it has been operating. I am sure there are little bits of tinkering at the edges which can be done to improve on it but my position would be that only about four per cent of HEFCE funds for research goes to 3b departments; it

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[1] *See* Annex B.

[**Dr Williams** *Cont*]

is really a very small part of the total. In the light of that I would be inclined to leave it with those departments. It does give groups of people in rather average departments from a research point of view, groups of people who may be quite talented and able, the opportunity to continue doing research, perhaps to demonstrate that they can move up. You want to give people hope, you want to give them the feeling that if they work hard and are productive and successful they are going to get rewarded. If you were to cut off at the 3a level, it would be quite hard on those departments. We also have to remember that the decision to allocate a department into a 3a or a 3b is often a very narrow one and it is often based on quite subjective judgements. They may be the right judgements but they are quite subjective and we ought not to close the door on the quite substantial numbers of people in those departments. To hand over what is a really very small amount of money to the 3as and above would not make a big difference to them but it would make quite a big difference to those in 3b departments who would lose those opportunities.

Dr Gibson

518. In your experience of the translation of money into the achievement of a grade, have you experienced personally or do you know in the country that there have been problems when a place receives a five star and crisis suddenly hits it because it finds it does not get a proportionate amount of money to keep at that level or higher? Do you have experience of that? Do you think the translation of the formula into money is a problem?

(*Baroness Blackstone*) It is always hard being at the top. It is like being Tim Henman in the Australian Open, is it not? You can only go down once you get to the top. You crash out. Any five star department or prior to the last RAE any five department has a terrific onus of expectation to retain its position and it gets more and more difficult, the competition gets tougher. People have become better at playing the game and there is a little bit of gamesmanship involved in the RAE.

519. There is a transfer policy like football teams.

(*Baroness Blackstone*) Exactly. There is that, there are decisions about who gets put in and who does not get put in. I have a personal view about this, but it is very much a personal view, and that is that if you want to be rated as a top research department with a five or a five star, all your potentially research active staff should be research active. This game of leaving people off should not be available to top departments and they should not receive a top rating unless they can put everybody in. That is a personal view and I do not know what will come out of the current discussions. As far as the allocation of resources is concerned, it is very difficult for university managements actually to identify every penny which might come in—you get these vast tables—and say "Here you are" and hand it all over to departments. I know individuals in departments feel that is what ought to happen but they are forgetting the fact that you may well have to have a small group of people in the centre of a university's administration who help to organise the whole process of applying for research grants. They have to be paid for and they have to be paid for essentially out of this money. You have to have a top slicing system and it would not make sense to say everything that is allocated to you through HEFCE as a result of your five star is going to go straight into some departmental fund. Universities are not run like that. Universities themselves have very big overheads and indirect costs to support the work of their best departments as well as their worst departments.

Mrs Curtis-Thomas

520. Can you confirm that you would be in favour of a further dual support transfer to enable the research councils to pay the full costs of the research they support?

(*Baroness Blackstone*) If we are to identify substantial additional funds for the research councils which would allow them to do that, there would be a good case for doing it. I would not want it to be done with cuts to the funding councils' allocation for research. I do think you need to have this cushioning. I also think that it is quite difficult for universities or indeed any research institute outside the university world to cost right down to the last penny every single element that goes into a research programme or a particular research project. There is a case for arguing for this but there is also a counter argument.

Chairman

521. You are saying that you would love to have a situation where the research councils were able to fund all the research they support but through additional new cash rather than transference.

(*Baroness Blackstone*) Exactly.

Mr Beard

522. The memorandum submitted by your Department draws a distinction in paragraph 4 between "research or scholarship in support of ... teaching" and in paragraph 5 "research aimed at a wider audience". Would you care to define what that distinction is?

(*Baroness Blackstone*) I hope I am going to be able to agree with the memorandum submitted. I have some difficulty with these terms. My own view is that in universities there are people who are doing research and there are people who are doing scholarship. Sometimes people do both research and scholarship. Scholarship on the whole is done by people in the arts and humanities, who are scholars in their own areas, who spend an enormous amount of time doing library-type work, which you can call research, you can call scholarship, sometimes you can even use these terms interchangeably. Many of the people who are pursuing scholarship are not going to be the recipients of research grants and the work they are doing may not be particularly project orientated; it is all something which is building towards the contribution they make in their own discipline which may lead in the end to a great book, it may lead to one article, it may lead nowhere for a little while. It is quite separate from the work of people who are essentially teachers, many of whom

[**Mr Beard** *Cont*]
are concentrated in the new universities, who do not actually do either research or scholarship, but who do have to keep up with their subjects. They have to read, they have to make sure if they are going to be good teachers that they know what the new developments are, whether they are social scientists or scientists or somebody teaching literature, but they are not actually publishing and they are not pursuing scholarship in that sense. I do not use the term scholarship to define preparing for teaching, which is keeping up with your discipline.

Dr Jones: Would you accept that in science in particular it is very difficult to divorce the two because in fact going to the library and reading the latest publication is actually very difficult if you do not have some kind of handle on research yourself? Would you accept that as distinct?

Chairman: I think the two Dr Jones is referring to which are not divorced are research and teaching not research and scholarship.

Dr Jones: And scholarship.

Chairman: And scholarship as well but not the differentiation between research and scholarship. It is research and teaching and the synergy they bring which we are really trying to get at.

Dr Jones

523. No; since I was asking the question. I agree on teaching but I also think it is important on scholarship. You cannot get it all from reading, you have to understand what it is. The papers people are putting forward are largely based on their own research and if you have not done research yourself it is very difficult to follow what is happening. It is important to have a window on what other research is going on, to be doing research yourself.

(*Baroness Blackstone*) I am sure that is more true in the sciences that it might be in some other fields. I am not a scientist myself and I need to be a little careful about what I say here. At the same time, it is perfectly possible for highly intelligent, very well educated people with enough time to do it, to follow developments in the field in which they work. If you are, say, a psychologist, you may not necessarily have to be at the forefront of research on identical twins to understand other people's work on identical twins. Of course if you want to have a real critical edge in how you read and think through whether that other person's work is going to go somewhere and if you want to be able to take it apart if you are doing research yourself in this field, you will be able to do that much better. I go half way with you. I see exactly the point you are making and I have always argued that if you are teaching research students or even post-graduate students you should be doing research yourself.

Dr Turner

524. Clearly we are getting into deep semantic waters here. Those who have been working scientists would say that in universities you cannot divorce teaching from research if it is a research university.

(*Baroness Blackstone*) I have just said that. I agree with you.

525. Having said that, Dearing did draw the distinction and suggested modest funding for people involved in scholarship, which is probably the best word for it rather than research in support of teaching. He suggested specific funding for that. From which budget would you see that coming, from a teaching or a research budget?

(*Baroness Blackstone*) I am not terribly taken with the idea, to be frank with you. We should be funding teaching properly in our universities. It is very important that we also encourage high quality teaching. There is a danger that by the status that is associated with high research ratings, good research output, that teaching can be undervalued and we must avoid that. The right way to value it is not to provide little pockets of money. I am not sure how this would be used.

526. I am not either.

(*Baroness Blackstone*) I would really expect everybody who has a university teaching job to be doing this; it is part of the job and you do not need a pocket of money to get people to do it. There are not many recommendations which come out of the Dearing report which I am unconvinced by but I am afraid this is one of them. I cannot really answer your question as to where it should come from because I do not really think it is one I would want to pursue.

527. You do not think it should come anyway.

(*Baroness Blackstone*) I suppose if you were going to, it should probably come out of teaching because it is work to support teaching.

Mrs Spelman

528. Do you support the Dearing proposals for the creation of an arts and humanities research council? If so, should it be part of the Department for Education and Employment or part of the OST?

(*Baroness Blackstone*) We have been consulting on the Dearing recommendations and there is overwhelmingly strong support for an arts and humanities research council. In the light of that support it is something we should try to see whether we can implement. At the same time we have to be aware that we could find ourselves running up very high overhead costs because in the arts and humanities what is essentially happening as far as support for research is concerned is the giving out of very small packets of money for quite large numbers of people. Of course there are very large numbers of subject groupings and if we are going to have peer review, if we then have to set up for every single subject in the arts and humanities a peer review committee of some sort, we then have to have somebody who is servicing those committees, administering how they operate. We could end up with administrative costs which really start to outweigh the benefits of providing funding for the arts and humanities by this particular method. It needs a lot of imaginative thinking. Further consideration is going on. We have not made any decisions about this yet. It does mean discussions with OST. It is a very tricky question and I do not know the final answer. It should not be in the DfEE. It should not be in a Department which does not fund universities directly. It should either be set up

[**Mrs Spelman** *Cont*]

through HEFCE in some way—and there are some discussions going on with the chief executive of HEFCE as to whether they could accommodate an arts and humanities research board and reduce the overhead costs by accommodating them literally at their headquarters—or it should be in OST. In many ways it looks rather odd to have a research council in the arts and humanities in an Office of Science and Technology; certainly people from abroad would find it bizarre.

Mrs Curtis-Thomas

529. I have been very interested in your comments with regard to the funding of research and how difficult really it is to allocate research and the benefits you incur as a consequence of that investment. I should like to take you now to outputs and you have made some reference to outputs as defining certain activities. I am particularly keen to look at defining research outputs into measures which could enable the council and the Department to understand the contribution which that specific research makes to UK competitiveness. Is there a possibility that you may look at defining outputs to relate outputs to competitiveness and if so, how will you go about this particular task?

(*Baroness Blackstone*) This is like an examination question: discuss. I would really want to defer to the experts in this area. This is an area where people have given some time and thought to how to do it. I turn particularly to SPRU at the University of Sussex which has spent more time on this sort of subject than any other group in British universities. It is well worth trying to do. I am not sure it is something which should be funded by my Department. I do not want to give John Battle a difficult time in front of the Committee but this is something that OST ought to be looking at. I believe that Bob May has done some work in this area. It would be helpful to do more work if only to be able to better inform ourselves of where the investments are likely to pay off most. We are working a little bit in the dark. At the same time, this is an area where you have to take risks. You cannot always be sure, even if you have done a lot of research on it, that investing in a particular way, a particular mode or in a particular subject area, will go on producing the kind of results that it may have done earlier. There are new fields which take off in the sciences. You cannot predict. This is where I feel so passionately that we have to say to ourselves that this is an activity that in an advanced industrial society is something which deserves priority and you cannot always do it on the basis of very, very detailed certainty as to how it will work out. You take risks and you consider that maybe this project or this big programme, which might cost quite a lot of money, will not bring in what you hoped in terms of output. You write it off and you start again. Another area where you did not expect to get the sort of outcomes you do turns out to be quite fantastic in terms of its returns. It is assessing risk and then being confident and courageous about your investment but of course if we could do more research which would help us guide our decisions, then of course we should. You need to address that question to the experts.

Chairman

530. I understand the experts are waiting outside for the next session. May I thank you, Minister, for coming along, being very frank with us, very helpful? I hope that when our report is published shortly you will find that of some assistance and guidance. Whatever we say in the report, please bear in mind we are only trying to present a report for the good of this nation, hopefully to help people like yourself. Of course what you think of it will be your own decision at the end but you have been very helpful to us. We thank you for that. We thank you also for bringing Mr Clark along with you and for your contribution, Mr Clark, to our discussions this afternoon.

(*Baroness Blackstone*) May I thank you very much for asking such perceptive and good questions? They certainly put me on my mettle. I really look forward to reading the report. Thank you very much.

Chairman: You are very kind; thank you.

Annex B

Supplementary memorandum submitted by the Department for Education and Employment

Note to the Select Committee: Government's Funding Policy for Higher Education: Net Savings 1999–01, 2003–04 and 2015–16

Estimates of the net savings from the new higher education policy for the period requested are shown in the table below.

The figures are on the present cash accounting basis and for the UK as a whole. They take into account the planned starting point of £10,000 for loan repayments and are therefore not directly comparable with the savings shown for different options in the Dearing Committee's report based on £5,000 starting point. On a comparable basis the savings from the Dearing options would be significantly lower by 2015–16. The figures do not take account of our decision to pay out loans on a termly basis, which released money in 1998–99.

£ million (1995–96 prices)

	1999–00[1]	*2000–01*[1]	*2003–04*[2]	*2015–16*[2]
Net Savings	100	150	250	1,100

[1] As reported in *Hansard* 31 July 1997 column 496.

[2] As reported in a letter from the Secretary of State to Mr Stephen Dorrell on 31 July 1997.

Examination of Witnesses

MR JOHN BATTLE, a Member of the House, Minister for Science, Energy and Industry, Department of Trade and Industry was examined and MR TONY QUIGLEY, Head of Science and Engineering Base Group, Office of Science and Technology, was further examined.

Chairman

531. Minister, welcome to our second session this afternoon. We are very grateful that you have found time in an enormously busy schedule with your three responsibilities to come along and talk to us this afternoon. We also welcome back Mr Tony Quigley. I will not, on this occasion, ask you to introduce him because he was introduced to us by Sir John Cadogan who was the first witness of this Committee in the new parliament. If you wish to make a short brief opening statement, we would welcome it providing it is brief and then we can start the questioning.

(*Mr Battle*) Thank you and thank you for inviting me. I am happy to come along. May I say that someone the other day—and it is language I am rather reluctant to use in this context—asked me what the output of the science base is. The answer to that is actually educated, skilled scientists and technologists and technicians. The science base in an academic environment is the source of innovation and it leads to the development, dare I say, of many ideas which get turned into practical services and products and processes. I would have to say that while many of the issues raised by the Dearing committee are probably properly the responsibility of the education departments, we do share with those departments responsibility for university research in particular. My Department does have a significant interest in universities as suppliers of graduates and post-graduates for industry and commerce, but also in providing opportunities for lifelong learning. I would add to that, ensuring that science and engineering and technology are underpinned as areas which youngsters want to go into in the future. There are about 100,000 student graduates with a first degree in science, engineering and medicine each year, a further 13,000 with Masters or PhDs. As Dearing records in chapter 3, we have one of the highest first degree graduation rates in the world. The universities are the largest component of the country's science and engineering base. I do believe that is one of our country's absolutely fundamental major assets. Maintaining and developing university research is absolutely crucial to the future prosperity, development and quality of life of our society and indeed life on this planet. I would emphasise that I see no contradiction but would work to see a fusion of wealth generation and prosperity and the quality of life matters. An expenditure of £2.8 billion of the country's resources is on university research and of this the research councils support about £1 billion, which includes the responsibilities I have; about half is in grants and the remainder in units, centres, central facilities, studentships and fellowships. I do believe our science and engineering base actually delivers in the terms we are looking to it within the Office of Science and Technology. You will be more familiar in this Committee than I with the figures. One per cent of the world's population here in Britain funds five per cent of the world's research, publishes eight per cent of the publications and receives about nine per cent of the citations. Sir Robert May, the Government's Chief Scientist, is spelling out these figures regularly to say we have a good and strong record. The Dearing Committee has done an excellent job of charting the situation within university research but it has also highlighted—and this I am sure is what you would like to focus on—the problems facing the dual support arrangements which arise from the dramatic expansion in higher education, the 70 per cent increase in full-time students between 1989 and 1995, the growth in the volume of research and researchers and the lack of capital investment in the basic infrastructure, buildings, facilities and the equipment. It is fair to say that perhaps the Dearing committee was not given a great deal of time to cover its very wide remit and it had to concentrate to a large extent on the overall structure of the higher education system and the financing of the undergraduate system. I would not want to see the emphasis on science and technology underplayed in this conversation around the Dearing report at all. We are in the process of gathering further information in conjunction with education departments, funding councils, the committees of vice-chancellors and principals to explore and develop in depth what Dearing suggested in this area. May I finally add that some of the committee's recommendations, not least many of the research ones, do involve, as I know, and you may want to press me, additional resources. We are in the process of the comprehensive spending review which affects my Department as it does every other. We are working through that at the present time. There are recommendations to which I cannot at this stage give a definite response. I know you have taken evidence from others and I look forward as well to receiving the report of this Committee in due course to keep a focus on this area of science and technology in higher education.

532. Thank you very much indeed and thank you for being brief. One bit of forecasting you have got right is that we shall be wanting to question you on funding and further funding. In your opening remarks you have actually answered the first question I was going to ask you which was: how important do you think research is for national wealth creation? There is no point going through that again. You indicated throughout the whole of that opening remark that you think it is very important. May I ask you about a comment which was made in the SPRU report in which it was said "... a new social contract is emerging in which there are more specific expectations that basic research should generate greater economic and social benefits in return for the substantial public funding it receives"? Do you agree that is the situation and that it is likely to become increasingly the situation in future years?

(*Mr Battle*) Yes, the expectation is there. Sometimes it is not enough to rely on successive generations of graduate students to carry their new knowledge and expertise into the marketplace. New

[Chairman *Cont*]

relationships have to be built between the laboratory and the workshop, nor do I take a facile and simple view of what is sometimes referred to as technology transfer; that is an unhelpful expression in some senses. It implies that we can simply raid the universities for ideas to then stimulate industrial and commercial development. I do not take that view and it can sometimes be pejorative to primary, basic, what is sometimes called blue skies research. I do believe that universities are key agents of change and of technological progress but just having ideas is not enough, how they are shaped and the programmes in the universities and how they are linked through to what is needed as a society and what we can support as a society—I mean not by government but obviously by investment in research and development by companies as well.

533. Do you think this is a cyclical process? You have mentioned £2.8 billion expenditure. It is a large amount of money. If the public at large, the taxpayer sees that we are getting very little for that £2.8 billion they will suggest it is cut. If the public at large see we are getting a great deal for that £2.8 billion they will say double it and let us get twice as much or three times as much. Do you not believe there is that sort of atmosphere?

(*Mr Battle*) Yes; absolutely. Budgets need popular support and you do not win popular support simply by reciting numbers, I am tempted to add. We have within the Office of Science and Technology a campaign which was there before and we have built on, started by to the previous administration, addressing this area of the public understanding of science, and how we take what is going on in universities out into the wider world. I would say two things. I have been tempted when I have looked at the science, engineering and technology weeks to find that people in universities think that the weeks are a good opportunity for them to find out what is going on elsewhere in science, engineering and technology, but I think this tends to devalue the event. We end up with people in the physics department thinking it is a new thing to do to talk to people in the chemistry department who talk to people in the biology department and then might talk to people in the computing and IT department. They think that is widening the public understanding of science. We have to get much further out of the universities to take people with us. I would also put it in these terms. As well as the public understanding of science—and I do worry sometimes that we are becoming a scientifically illiterate culture where everything is reduced to the naively simplistic—we have to get people to believe that science (a) is important and (b) is not that difficult but they need to make an effort to understand what is going on. So there is a communication job there. I put it back to saying we also need a little bit more emphasis on science and scientists' understanding of the public to take them with them. If I give one of the most difficult areas, I have spent every Sunday for the last four months responding to press enquiries about biotechnology, a very difficult area. Sometimes I think the communication of the new ideas is not thought through and as a result the worst fears are exercised. I am thinking of Dr Richard Seed recently. Then we get a whole series of irrational oppositions to science in principle with the appalling notion that someone writes to me with that it is appalling that we have science at all and should we not ban it? We do not need to end up there in society; we can do much more to suggest that science is important. More crucially we should encourage youngsters to study science, engineering and technology at school, stick with it and get into the universities so we are not seeing departments reducing but rather increasing in their strength.

Dr Gibson

534. You clearly have a vision for science in the future and we could agree together that the Prime Minister probably does too because he does speak about it in speeches he makes. If we get down to the situation of maintaining the base and developing it for that vision, research councils do not really pay the full contribution to the research which they fund, do they, to the indirect costs? Why do they not pay the whole lot, get their chequebooks out and pay the lot? The next question is: why do Government not help them to do that?

(*Mr Battle*) Until 1992, which was before my time, the research councils were only responsible for the marginal direct cost of the research they funded and the remaining funds were funded by universities from their funding council block grants. Then it was decided that the research councils should take up full responsibility for all direct costs except the academic staff cost, the premises and the central computing. Contributions then for indirect costs were set at a rate of 40 per cent of the total staff costs on the grant. There was a transfer at that stage from the funding councils to the science budget of about £150 million to pay for the increased research councils' expenditure. At present you have research councils paying a contribution to indirect costs of research funding through their grants based on that calculation of 46 per cent of the eligible direct staff costs. The reason for the change was that the dividing line had become increasingly unclear and the transfer of responsibility and funds was designed to improve the transparency and understanding of the costs. Dearing's suggestion was that the payment of the full indirect costs would be a response to the funding gap. In support of the current volume of research there was a suggestion that there should be a public sector contribution towards that funding gap and the way that would happen would be through providing additional funds through an increased research council indirect cost payment. I have to say there is a down side, which we ought to be aware of; that of the implications of the councils paying the full indirect costs without any additional funds—and you may want to press me later on on the structure of the budget and where it is going, but leave that question in abeyance—if you do not assume that, assuming that the cost set in Dearing is about £110 million, there would have to be a total moratorium on all grants and studentships if it were to be brought in for all grants. If it were phased in on new grants, the result would be some 25 per cent reduction in grants, assuming all long-term cuts in studentships. I would be reluctant to say it is a quick fix simply to dump it back down on the research councils. Without

[Dr Gibson *Cont*]

additional funding across the board, it would cut research. I would also add that there are implications as well and the effect it would have on the universities themselves because it would actually reduce the vice-chancellors' flexibility as well; it would fix or freeze it. We have to take that into consideration before we simply accept the Dearing recommendations. It is not a quick fix now, given that dual funding structure.

535. The vision is blown immediately, is it not? You cannot do the things you want to do unless you do something like that because it means a lot of younger people will be unable to get the grants because you have just reduced the money and they are going to receive less because all the more established people receive the money and younger people do not. They are just the very people full of lively ideas, joined-up thinking—

(*Mr Battle*) I knew it would come back to haunt me. Making efforts to do joined-up thinking. I do not think there is no problem. There is certainly a problem. What I am suggesting to you is that simply to see an easy transfer looks good in a budget line but will it work in practice? Let us put the flexibility for the VCs on one side; that is an arrangement and a management question. If we were simply to implement it without additional funding, I have to take some responsibility to work out what the implications are. I simply set them out before you so that you are aware that I am aware of them, because it is not a route I am too keen to go down. The dual support works reasonably well and I am not keen to see it dismantled. We do have to address the fundamental question which still remains, which is how we support research. I think that is fundamentally a budget question.

Dr Williams

536. Is it possible for universities to identify those indirect costs without starting on a new bureaucracy simply to identify those indirect costs?

(*Mr Battle*) It is really because they have to do it now. They have to pull out now academic staff salaries, premises, central computing. In a sense the structure is already there for them to isolate and identify. You are right. If the background to your question is the streamlining and making the situation easier, then obviously it is easier if the funding is from one source and it is clear where that source is from. I do not deny that streamlines paperwork and makes it easier. We have inherited a situation and to move away from that quickly could end up in a reduction without increasing the costs. It is not impossible. They have to separate out costs now and account for them and I do not see why it could not continue for now.

Dr Jones

537. When you say "they" who do you mean? Are we talking about the universities?

(*Mr Battle*) In a sense I am really talking about the funding council they have to answer to and the research councils themselves. The research councils work on a project basis and when I say "they" I mean in assessing the projects with the dual funding we have to select out between the two who pays what and where. That happens now but it is based on the information which comes through from the university. It is a statement of where they are in relation to the funding councils.

538. There seems to be widespread agreement that one of the major crises in research relates to research infrastructure underfunding. Everybody agrees that the figures put forward by Dearing are about right but that the solutions he proposed are really just tinkering at the edge. Do you agree that this is an enormous problem? Do you agree that Dearing has not really come up with solutions? Do you have any of your own proposals?

(*Mr Battle*) Yes, I believe there is a problem. Yes, I believe that Dearing has not come up with solutions. Yes, we have some proposals and we have implemented some proposals. The answers to your questions are yes, yes and yes. If I could take them a bit further, I would have to say that one of the privileges of being the Minister for Science is that you get invited round to universities. I often have to insist that I would like to see the down side of the world because I always get invited to the openings of new laboratories and new facilities. In the last four months I have been through to see three new laboratory facilities open. That contrasts markedly with some of the laboratories I visited in opposition when I covered the science brief two years ago, when I saw the worst side. I am well prepared to believe we have a long way to go and the figures and the analysis within the Dearing report do bear proper scrutiny when you go round to look at the situation. I simply say that because I do not think the whole world is falling down and there are some very well equipped university research departments. At the same time there is a pattern for the infrastructure as a whole. I do accept that there is real pressure on university budgets and there is evidence that universities generally would prefer to fund additional researchers rather than equipment and maintenance of buildings, the revenue costs rather than capital costs and they move to that all the time. Let me be slightly more positive and say that there was a scheme which the Office of Science and Technology and higher education funding councils launched called the joint research equipment initiative. That was set going in February of 1996 to promote partnership between higher education institutes and external sponsors and then applying for funds and matching funds from industry, charity or external sponsors to try to ensure that there is some backup.

Mr Beard

539. Do you think, now that this has become a more permanent feature of the scene, that it will raise enough funds to solve this problem of funding the infrastructure?

(*Mr Battle*) No, is the answer, unequivocally. It is not the complete answer and the problem will not be solved overnight. I simply say it is an initiative we want to support because it goes some way to making some inroads. We cannot do nothing. The initiative was there and just recently we announced that the education departments and the science budget contribution to the second round of that would

[**Mr Beard** *Cont*]

actually be increased to £35 million. We have actually increased that contribution. There is a total of about £80 million of equipment; 250 pieces of equipment to some 55 different institutions. That is not the answer at all, given the scale, but at least we are trying to send a signal in the right direction and attract interest in this particular problem and come up with rather more imaginative packages to try to address it. No, it is not the answer at all. I do believe that there is a need for infrastructure investment which transcends that.

540. How much do you think it will raise next year say?

(*Mr Battle*) We raised about £80 million this year and we are hoping that it will pull in, pulling in private money as well, at least that much again.

541. Do you think industry will continue to support this on the same scale now it has become a regular event?

(*Mr Battle*) I think they will, yes. That general hold-all word "partnership" is loosely used as if we will just have a partnership between academia and industry, get them in the same room and they will resolve the problems of the world overnight. Like all partnerships, it takes a lot of effort and hard work and what they need to do is to look very carefully at the relationship between industry and academia. I say that because when I meet with universities and science departments I often ask them what they feel the relationship is like. I would put it in two ways. I would not want them to feel that their ideas and research were simply being raided by industry and their intellectual property was being taken away and exploited by somebody else and they received no benefit from it. I do not want them simply to believe that because they have to raise money, and from the private sector, they have to sell out to them. I want it to be a tougher relationship. At the same time I have to say that what industry, with some of the most advanced science we are developing, within industry and commerce, within this society, are saying to me is not that they want people to work on specific projects for them within universities, so they have got them going there and they are getting the government funding to do it discretely, they want properly trained people, they want people qualified with expertise right up to PhD level, even if it is not in the particular area that they themselves may be developing. They understand the need for investment in the primary science base. I have to say I had a meeting this morning with pharmaceutical and biotechnology companies and to some extent I was slightly surprised that they put it right on top of the agenda: investment in infrastructure, universities, the need for people to be trained, top quality, skilled. We can develop a mutuality of interests which makes some sense of that word "partnership" so it is not all one way and universities do not simply believe that because they have to raise funds from the private sector, they have to sell out their property rights and have an unequal relationship. We can do more than that.

542. The criticism of the Joint Research Equipment Initiative which is sometimes raised is that this is really not providing new money, it is purely diverting money which would have gone into research and development anyway. Do you think there is some justification there?

(*Mr Battle*) No, I would have to say that within this budget this year funds have been increased and the reason for the budget increase this year—two rounds have gone on to date totalling £130 million, if I look at the figures—was we looked to see where we had any space even within the tight brackets of the budget we had within this year. Some funds became available, dare I say, because some of the science budget is funded through subscriptions to international organisations. Because of the currency differences, let me put it like that, money became available which we decided to put in which was additional money put in behind this scheme. It is not an excuse for a shadow funding organisation; there is an attempt to put real money in there behind it.

543. I was thinking more of industry; that the industrial side would have put the money in anyway is one of the criticisms made.

(*Mr Battle*) They are free to put more in now, dare I say, and would be encouraged to. We have had to provide some stimulus for that to get it going and say we are serious about a partnership and try to draw their money in. I am minded of the Dearing suggestion of the pot for the £500 million for equipment. I seem to think that industry was not too keen. The view was that it was a bit like putting a raffle prize on the table and walking away whereas they wanted rather more direct say in what projects were there because that has been the traditional way they have responded to it. I do not see that much evidence of that £500 million emerging and that is the figure in the Dearing report. If it does not, that is back on the public sector again, is it not? I am looking for a more practical pressure on industry to say yes, we agree with the common agenda, we want a strong science, engineering and technology base but we need to make sense of that word partnership which means putting some of your money up front to do it. We are putting public money up there. Yes, we have to justify that public money against other budgets within government and within the popular consensus at large. We are prepared to take that on and we encourage industry to come with us on that and do more.

Chairman

544. You say £80 million has been raised by this Joint Research Equipment Initiative of which £45 million comes from non-government funds. In round terms it is half government, half non-government. Would government continue to match money which is raised from non-government sources through the JREI? Suppose it were £100 million which came from non-government sources, do you think there would be something close to another £100 million coming from government sources?

(*Mr Battle*) I cannot speak for what figures are going to be in the next PES round there and we are struggling to match them. There have been two rounds which have operated to date. That has led to a total of £130 million of equipment, of which £13 million came from the research councils themselves, £46 million came from the funding councils and then

[**Chairman** *Cont*]

£70 million from external sources. We are hoping the figures may be around £25 million of public funds in the total funding for 1998, so we are increasing our contribution but I am looking to industry. It is not 50:50. The problem with the 50:50 arrangement is, as in some of the lottery projects, if you do not raise your 50 you do not get the other 50 either. It is not such a tightly knitted together structure. If you like, it is the stimulus to try to get private sector investment in because in the long term it is in their investment interests.

(*Mr Quigley*) It is not strictly 50:50, but we try to operate it on the basis of what we call the best affordable mix of projects. In practice the non-government contribution has actually been bigger than the government contribution. In the last round there was £20 million of industry proposal that we were not able to tap; they were eligible proposals but they just were not funded. Having put this scheme on a permanent basis, as opposed to re-inventing it each year, which is what we have done in the past, should make it even better in the long run. If we run it annually and invent it annually, people then have very rapidly to put together their joint proposals with firms and it can catch the companies at the wrong time of year in their planning cycles and so on. In the long term we should actually be doing rather better. The question then is simply one of how much money we will have available to set alongside the bids which come in.

Dr Kumar

545. You quoted £500 million as Dearing's estimate for shortfall for infrastructure and such equipment. Are you happy with that figure or have you made any estimate yourselves? There is a big controversy as to what the accurate figure is. A lot of people made a much higher estimate than £500 million. Do you want to comment?

(*Mr Battle*) The answer is that in our Department we have not, but it is really within the bailiwick of the Department for Education to come forward because they are responsible in that sense for the universities. What we have to do is to make sure that the projects we are funding have equipment backing them up. Obviously there is an interest from our side to make sure that universities are properly equipped and that when research grants are granted people have the equipment and the top class equipment to back up those projects. The answer briefly is no, it would not be within the remit of the Office of Science and Technology to do a survey of universities and to find out what state their equipment is in. Obviously we are consulted when the DFEE actually look at that.

(*Mr Quigley*) It is a soft number but it is the best available number, is the short way of summarising it.

Dr Jones

546. You said that this initiative would not meet the shortfall. What other plans are there? We will be having questions later on about the OST budget.

(*Mr Battle*) Having taken that initiative within the Office of Science and Technology we are making quite a major contribution from our end.

547. If it is £500 million, it is not small beer.

(*Mr Battle*) I agree, but I am not responsible for the education budget. I simply say that. I think it is actually 25[2] times the size of my budget.

Chairman

548. You wish you were responsible for it.

(*Mr Battle*) I would not mind at all. If you want to make that suggestion as a result of the Select Committee's deliberations, be my guest.

Dr Turner

549. You referred to the £2.8 billion overall which goes into British science and suggested ways of levering more industrial money in, money from private industry towards that. In international terms the contribution to British science from industry is actually quite good but the contribution from government over the last few years looks pretty seedy, certainly measured against other members of G7. The overwhelming burden of evidence that we have heard in front of this Committee is that there is actually a crisis in the funding of British research. Set against that background, it obviously seems slightly problematic that the science budget for the coming financial year has actually been reduced. May I ask how you and the OST intend to make up for that cut in real terms?

(*Mr Battle*) First of all, to back up a stage, I did not set the science budget, it was set before we came into office and when coming into office we said that we would accept the planning figures which were set for two years and have a comprehensive spending review to then set the budget priorities into the future and set the budgets consequently. I think we had a right to take stock and do that. Inevitably we inherited planning figures. I have to say that I do not accept we have moved away from it.

550. I was not seeking to suggest that.

(*Mr Battle*) On the science budget which is set for 1998-99 announced last week the individual councils' allocations are actually as previously announced in the planning figures for 1998-99, so we have stuck with it. I mentioned before the strength of the pound released some £7.2 million from the international subscriptions and that was used to strengthen the second and third rounds of the joint research equipment initiative. Yes, I am aware of the science budget baseline, very aware of it, and we are working on that as part of the comprehensive spending review. I cannot here say what the outcome of that review will be, but we are fighting hard to ensure that science is not downgraded further.

551. Do you feel that this cut in the science budget is going to impact on the volume and quality of research which the research councils will be able to sponsor?

(*Mr Battle*) All cuts impact. I am simply saying that under the mandate I was asked to undertake from our election commitments I was asked to stick within the planning figures that we had and I have worked to do that. We have actually achieved that. It

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[2] The Education Budget is approximately £35 billion and the Science Budget is approximately £1.3 billion.

[**Dr Turner** *Cont*]

is holding the position as it was. It is not putting back funds which have been cut historically over the years. I am not in a position to come in and give an injection into a budget within the first six months of office as indeed other departments were not unless there was a radical change of priorities at the centre within the early weeks. Money was raised from a windfall tax to address a very particular area of spending. I have to say science was not within that particular bracket.

Chairman

552. I do not wish in any way to be making a party political point and I trust you will not take it as such. I understand that you have decided to keep the budgets which you inherited until such time as you think it appropriate to move forward in a different style and different way. Does that preclude you from changing priorities within the budgets you have inherited? If it does not, have there been any areas where you have thought, within the inherited budget you were obliged to stick to, you wanted to change one or two priorities?

(*Mr Battle*) The answer in general terms is no, but the problem is with the budgets I have inherited for the research councils. When I look at the science budget there is not a lot of space at all because the money is actually committed on projects which go on for two and three years already. Subscriptions to CERN are there already. You might be surprised how much the currency fluctuations impact on the science budget but they do. Fortunately this year it helped the headroom a bit. That is where there has been a change of priority. We had to argue with the Treasury but we kept the savings from the CERN subscription in science, to the joint research equipment initiative. Yes, there is in theory, within the brackets of that budget, space to manoeuvre, but if it is all committed on projects which are all lined up it would end up saying to researchers, no, I have changed my view now. I do not want particle physics research. I would have to say within that that I do not decide what research is done within the research councils. I do not think I should pick my pet science projects and tell them what to fund and say I have a preference for biotech or physics and I am not too keen on chemistry or engineering and that sector. It would be wrong of Ministers to do that. Research councils receive a budget and they work within that. They are committed so it backs up the pipeline and there was no headroom at all. To be fair we went through the budget in great detail within days of arriving in the Department to see what headroom was there.

553. Because of the lead time you just cannot do it even if you want to.

(*Mr Battle*) Absolutely. I am not too apologetic for the Chancellor's decision to have a comprehensive spending review. It is a very good thing that we go through the budget line by line precisely to do that and ask whether the budget fits our priorities, what space there is within the budget to change them, what programmes can be changed and altered. What we have done, by accepting the previous brackets of the budget, is in a sense we have given ourselves time to break out of the annual PES round and allow ourselves to shape up priorities. That is a tough conversation and I know it is in the background and within the privacy of the rooms of the departments and not shared publicly at this stage because we have no answers to put forward. That work is going on. I would argue that not only did we have a responsibility to do that when we took over as a new government, but it does create the medium and longer term space to look at priorities and see what they are. I simply say to you that I do not enjoy the short term and I am very worried sometimes whether we will survive the short term into the medium and long term. I do not mean it in this particular area but in some areas I cover I have been more than aware of that particular question. Try me on energy, as it were.

Dr Jones

554. May I ask whether the importance of the science base for our economic health is recognised by the Treasury?

(*Mr Battle*) I am tempted to say not sufficiently is my response to that. We cannot spell it out enough, nor do I want it to be fixed crudely and that is why I made those remarks earlier on about simple technology transfer. If you had all the people in universities coming up with the right products and they all get them on the conveyor belt and down the line, we will make a lot of money as a country. We have to explain a rather more subtle question of the need to support a science base and why. There is no shortage of good strong stories of individuals, groups, academic clusters which can actually be shown to have made a fantastic contribution across a whole range of science and engineering subjects. Sometimes within the Treasury they are number focused but not sufficiently story focused. Maybe we could get across good examples to the Treasury to show the benefits rather more often than we try to. We tend to respond. I take your comment back personally. Perhaps we push numbers in the direction of the Treasury rather too often in our response to them rather than giving practical examples of what is going on. I do not think it is sufficiently appreciated by the Treasury but I would have to say it is not sufficiently appreciated by society either and in industry. If you look at the R&D scoreboard of industry and commerce's understanding of the need for research, design and development, it is pretty abysmal really. If we cannot communicate it within wider society, we are going to have a big job getting the budget supported.

Mr Jones

555. May I press you a little further on the budget? I understand you were left with what I consider to be an unsustainable spending programme with a cut for your budget. Witness after witness has come to us and told us that there is a crisis in British science. Will you be making any bid to the Treasury for additional money? I understand the comprehensive spending review is going to take a long time. We have had the windfall tax which is going into one project but there is another windfall which is coming the way of the Treasury shortly. Self-assessment is going to finish at the end of next week and those three million people who have not yet submitted their tax returns are

[Mr Jones *Cont*]

going to have a fine of £100 levied on them. Will you be making a lot of noise to the Treasury pointing out they are going to be getting this extra money and making a bid for the science budget to have a chunk of this potential £300 million?

(*Mr Battle*) Let me say that across a whole range of projects ring and fields it is not for want of trying, that we are beating a path to the door of the Treasury and asking for more funding. It tends to be on a project rather than a generic budget basis because I know what the answer will be on a generic budget basis. It has happened in the past and it will happen again because things happen during the course of months and weeks and years in between budget arrangements being made and settled. The answer is yes, I am more than happy to fight my corner with the Treasury and will do. I want to fight and win and not simply to meet a slammed door and be told to go away because I am simply asking for a budget. I would emphasise this and it is an important point to make. Do not forget that the science budget, the budget of the Office of Science and Technology, is ring-fenced within the Department of Trade and Industry and remains ring-fenced within the comprehensive spending review. That was a very, very important battle to win. There was a debate before on where the Office of Science and Technology should be located. I will not go into that. I do not want to see the boundary between the OST and the Department of Trade and Industry dissolved and I will tell you why: I do not want projects within the Department of Trade and Industry to come in on the science budget and reduce the base even further. I actually want the OST to be in the centre of the DTI and pushing outwards so some of the other budgets go in behind what is happening on the science budget. That ring-fencing is crucial, absolutely crucial, because it does mean you cannot let there be a leakage from the science budget into the DTI budget. That is important.

Dr Gibson

556. The Department of Health. It is clearly obvious that the human genome project is going to come to fruition and it is going to have revolutionary effects on the Department of Health. Do they understand that, in your opinion?

(*Mr Battle*) I cannot express a view on that as I do not know what they think. As a whole, perhaps as a whole Government I am tempted to say and as a society, we have not appreciated that. I would add that I have been very encouraged by the fact that the Chief Scientist, Sir Robert May, has been making statements to that effect and on the impact of the human genome project on the twenty-first century and its implications for science, research and indeed for burgeoning biotech industries, our relationship with America, Europe and the rest. We are catching on. To throw back at you and claim back my joined-up thinking between departments, it is important that the industrial sectors, looking at chemistry, pharmaceutical and biotech companies, link to the office of Science and Technology in looking at what support structures are in there, right through from the primary research, right through to help the setting up of small companies. That is one area where the creativity, the innovation, is making small businesses burgeon and they grow very fast indeed, from nought employers to 50 employees very, very quickly. It is a growth area we cannot afford to neglect and that means ensuring there is an underpinning for it. I went to Germany yesterday where the Science Minister told me he had discovered biotechnology and the Germans were going to make it their primary focus for the next century. Without getting too parochial about it, we have a great track record in biotechnology. We are second to the USA. We do not need to lose that experience, expertise and skill. I do believe it has a major contribution to make to the quality of life and wealth generation in the next century. We should pick that joined-up thinking up across government departments.

Mrs Spelman

557. Why should not charities be required to pay the full costs, direct and indirect, of the research they commission? If they were, what do you think would be the likely impact on the volume of research and the proportion of the research budget they spend outside the UK?

(*Mr Battle*) Requiring the charities to pay the full cost rather than at present matching it.

558. Yes.

(*Mr Battle*) There is a problem with matching it obviously because they do not pay any element of the overheads and any charitable money which is received adds to the overheads, does it not? I could see people turning the money away on the grounds that they cannot afford to accept charitable money because they then have to have a matching overheads cost to pick up as well. Charity income does act as a volume measure in the funding councils' formula for determining their block grant. If we increased the weighting given to charity funding and that increased the block grants, particularly within medical, we could be in difficulties if we say they pay all the costs because we could reduce the amount of charity funding as a whole. I worry about that because the budget contribution which they make in Britain is relatively significant, not least in medical and biotechnology. If we were to push them too hard, maybe we would lose the whole lot. I would not be keen to do that. I would simply say to you that as a proportion, based on the figures I have for 1995-96, the latest figures, the UK-based charities put in 14 per cent of the total budget, research council grant 22 per cent, funding council block grants 34 per cent. It is quite a substantial figure and it is double that of business which is seven per cent. Business put in £170 million to UK charities' £338 million. There are substantial chunks of money coming in from charities which we should not underestimate. We have to handle that one very, very carefully. I do appreciate that universities who say they have an offer of charitable money and they have to meet the overheads, are in a position now where they are not even able to accept the charitable money. It may well go elsewhere, as you suggest.

(*Mr Quigley*) We do recognise that the charities do actually pay for some infrastructure projects and people tend to forget that. The charities argue that their charters do not allow them to commit money

[**Mrs Spelman** *Cont*]
when they do not know precisely what they are getting. Historically that has been a problem with universities on the overhead question because the charities argue that they do not know what it is for, therefore they cannot pay it. The greater transparency one would get if we went down the full overhead recovery scheme could well help that and would certainly change the grounds on which the charities argue.

Mr Atkinson

559. My question is on Dearing's proposal for the creation of an arts and humanities research council. Baroness Blackstone has just told us that there was overwhelming support for such a council coming from the consultation. Do you think that there should be an arts and humanities research council? If so, where within the Government should it be located and how should it be funded?

(*Mr Battle*) If I could interpret the word "location" very particularly, we need to think out the proposal in great detail before we simply shove it in Swindon, quite frankly, and say it can merge with all the other research councils. Let us sort out the principles of what we are doing before we go to the building.

560. I meant which department.

(*Mr Battle*) I accept that and I will come back to that as well. Dearing actually said it would not be appropriate to go in the OST because the OST is in the DTI. He preempted it coming across to the OST and within the DTI. I am not clear. Arts and humanities research covers a whole range of subjects. It is roughly half the research units of assessment. The research councils I have responsibility for cover 35. Arts and humanities cover another 34. Simply to be one research council to cover the whole of that lot ... I am not clear, is my honest response to you. I do not have a clear view, yet I recognise the need for arts and humanities research. There is precisely the same conversation going on in Europe around the fifth framework of European funding council: how much should be cultural, arts and humanities research? As someone who was engaged in humanities research, I have to be very careful how I respond to that particular question so I do not have to declare an interest. I simply say to you that I recognise the need for it but we have to think out very carefully how it is located in departments and how it fits with an emphasis I really want to see on science, engineering and technology. That is my primary responsibility and there is a distinction. We have the economic and social research council, the social sciences, but I could put up an easier argument, given the sectors of the units of assessment as they fit more neatly into the brackets. It is clearer where I am with that than with a broader arts and humanities. I am not quite sure it has been thought through is the honest answer. If it is thought through, then I would be in some difficulty to know how it could be located within the science sector of our work in the OST.

Mrs Curtis-Thomas

561. I accept the comment you made with regard to the relocation of the Office of Science and Technology if you did include the new arts and humanities research council, but what about renaming and the reconstitution of the Department?

(*Mr Battle*) Of the whole Department so we do not call it the Office of Science and Technology and we call it the Office of Science, Technology, Arts and Humanities.

562. Or even the Office of Science, Engineering, Technology, Arts and Humanities.

(*Mr Battle*) It is not as easy as just renaming and rebanding the Department. Back to Dr Gibson's question about joined-up thinking between departments. I resent the idea, as someone trained in the arts and humanities, that arts and humanities are creative, science, engineering and technology are not creative. I think science, engineering and technology are incredibly creative. Then what happens. Do I have a great argument over what is creative media, creative culture, over with Chris Smith in his Department? When we are looking at creative industries we then have a disjuncture between what goes on in the DTI and what goes on over in Culture, Media and Sport. I simply say that we are in an area that transcends departments and that is not looking at higher and further education either. Simply calling the Office of Science and Technology the Office of Science, Technology, Arts and Humanities would not resolve the problem. I am perfectly prepared to look at structures which transcend departments and the way we pull things together in exactly the same way as we are pulling together addressing creative industries. That includes science as well as design and the rest of it and how we work on that kind of particular frame. I am less clear and Dearing did say that the style of arts and humanities' research is completely different from that supported by the other research councils for which I am responsible. I have not given sufficient thought, dare I say, to thinking out the whole of the arts and humanities sector as well as trying to cope with the whole of the science budget but I would hope that the Department for Education would do some work on that as well.

Chairman

563. Minister, thank you very much indeed for helping us speed up at the end there. We are most grateful to you. We have all individually and collectively seen your enthusiasm for the mammoth task you undertake. We thank you for what you are doing for science in general and particularly for coming to see us this afternoon. We wish you well in all your endeavours. We know your heart is in it and we know that the Department is in good hands. Thank you for being with us this afternoon.

(*Mr Battle*) It is a pleasure; thank you. I look forward to the report. If you need me back again, simply invite me and I shall be more than happy to attend any Committee sessions you wish.

Chairman: Thank you. May I also thank Mr Quigley for re-appearing as an encore. Thank you very much indeed.

APPENDICES TO THE MINUTES OF EVIDENCE

APPENDIX 1

Memorandum submitted by SmithKline Beecham

INTRODUCTION

SmithKline Beecham welcomed the establishment of the Dearing Committee and fully endorsed its terms of reference. From our perspective, the key issue covered by Dearing is the need to promote world-class research in the UK, founded on excellence. As a leading healthcare company, our success is built upon excellence in R&D. A strong academic science base is therefore vital to us. Unfortunately, we have doubts about the ability of the UK to continue to provide the necessary excellence in science and technology education. The UK is falling behind as other countries grow their science base more quickly. We believe these concerns need to be addressed urgently, and saw the Dearing Inquiry as an appropriate mechanism.

We welcome the unequivocal message from Dearing that "there is an urgent need to put right past under-investment in the research infrastructure". As the Report says ". . . Research expenditure in the UK compares unfavourably with that in many competitor countries . . . The importance of the research base to the national economy, and its cost-effectiveness, provides a strong case for increasing the present level of funding."

We have concerns that the main recommendations on research in the Dearing Report may not be feasible or adequate to sustain a capacity for world-class research. We have already discussed some of these points with Sir Ron Dearing himself and we outline our rationale below. However, we accept that addressing flaws in the UK's academic science infrastructure, developing policy and promoting excellence requires partnership between Government, academia and industry. There is a new climate for constructive dialogue in the UK. We acknowledge our important role in championing efforts to resolve the research issues discussed by the Dearing Inquiry and to ensure that momentum is not lost.

We now ask for further consideration to be given—as a priority—to identifying and reviewing other options for increasing intensity and selectivity in resource allocation to promote excellence in research and training. We would welcome the opportunity to support initiatives to explore these options.

Although our predominant concern is with the academic science base, we have views on many of the other issues considered by Dearing. We share many of the assumptions and conclusions on teaching in the Dearing Report. We are pleased at the emphasis on involving the users of the outputs from Higher Edcuation, endorse the importance of establishing equity in access to Higher Education, support integration of objectives with Further Education, and welcome consideration of the impact on secondary education. We support increasing the opportunities for more young people, sharing the opportunities more widely in lifelong learning and expanding the diversity of outputs.

We have tried to be succinct in this response. If it would be helpful, we are willing to provide further amplification and clarification—with evidence—on any point.

OUR EXPECTATIONS

Life sciences and biomedical R&D are national assets that must be nurtured. In our submission of evidence to the Committee of Inquiry into Higher Education, we highlighted three key areas which cause us particular recruitment problems:

- Inappropriate Courses—many courses, particularly in the biological disciplines (cellular biology, molecular genetics, bioinformatics) are not focused on the skills and technologies needed by high-tech industries. There is generally too much emphasis on traditional disciplines. Universities must do more to obtain input on the relevance of course content and to adapt to the needs of business. The structure of many courses is inappropriate—only a proportion of science graduates need to complete courses that are intensive in laboratory techniques and research training.
- Inadequate University Equipment—there are chronic problems of underfunding with regard to people and infrastructure. This is most clearly demonstrated by university equipment, which is in a parlous state. In the PREST survey 79 per cent of university departments were found unable to perform critical experiments because of a lack of funding for equipment. Nearly half of the departments considered their equipment below average in international comparisons. Inevitably, many science graduates are not trained on modern equipment. Problems in academic infrastructure (eg, outdated equipment) create new costs (eg, in remedial training) for business because science graduates are ill-prepared for work in laboratories. For university equipment, the PFI is not a credible alternative to Government funding. It is not the role of charities or industry to invest in infrastructure in place of Government.
- Lack of Prioritisation—money is being spread too thinly and not sufficiently prioritised. Greater selectivity and a focus on excellence are essential. Not all universities are the same or can aspire to

> the same roles. Concentration of funding is essential for viability and international competitiveness. Dearing has recognised and endorsed the importance of targeting funding on high quality departments. We look to Government to be creative and bold in promoting the necessary selectivity and intensity in resource allocation. The need for universities and funding bodies to prioritise and accept accountability in line with national objectives is urgent.

There is much to admire in the commitment of the Dearing Inquiry to address these issues and in some of the detailed prescription. Unfortunately, as stated above, we do not believe that the main recommendations on research in the Dearing Report are necessarily feasible or adequate to sustain a capacity for world-class research. We comment on some of the points of detail below.

Proposal for an Independent Advisory Council on National Research Policy (Recommendation 35)

We are not convinced that a new body is required. What is needed is:

- a better understanding of the successes and the barriers to success of the existing high-level groups (eg Council for Science and Technology);
- more transparency in the consultative process;
- explicit alignment of strategy with developing national priorities (eg arising from Foresight); and
- better opportunities for the research users (such as the R&D-intensive companies) to articulate their views and engage in informed dialogue preparatory to policy development.

Alterations to the Research Assessment Exercise and the Balance Between Teaching and Research

We have questioned some of the sweeping generalisations made about research excellence following the 1996 RAE. In the life sciences, only biochemistry, and perhaps pharmacology, rank as genuine national assets. There are strong suspicions of grade drift since the 1992 exercise, compounded by apparent gamesmanship by some universities to alter the boundaries of the research assessed.

The RAE anomalies do harm. There are penalties for collaborative work with other departments, other universities and industry, yet it is of the greatest importance that such collaborations should be rewarded. The principle of a quality-based review for auditing and accountability is important but the departmental focus can be problematic—we worry about minorities of excellent researchers within poorly-ranked large departments. Other key issues (that we raised in our evidence to the Dearing Inquiry) are that the RAE is inevitably reactive rather than proactive and that the RAE does little to address the issue of comparing quality between different disciplines. This issue is important in attempting to prioritise the UK research strengths. Moreover, there is another important practical problem—once the institution has received HEFC money, it does not have to be distributed among departments in line with RAE valuation, ie HEFC intentions to reward can be ignored. We recognise that universities may want to progress other strategic considerations but it is not appropriate to divert RAE-based subventions to other purposes.

With regard to the Dearing recommendations for RAE, we wholeheartedly support the principle of promoting excellence in research by concentrating the allocation of funds. However, it is important to retain some mechanism to fund strategically to develop new sources of excellence in order to prevent fossilisation of present patterns. Alterations to the RAE can only be considered in the wider context of the balance between HEFCs and the research councils in the dual-support system and we ask for urgent consideration to be given to encouraging new ways to promote regional links in order to safeguard the sharing of research facilities by the best researchers, irrespective of institution. Given these safeguards, we do not disagree with the proposal to encourage the strategic decision for departments to consider whether or not to enter the RAE and, hence, recreate a binary divide.

Postgraduate Research Training

We agree that it is important for career scientists (and others) to be appropriately trained in communication, management and planning skills (Recommendation 31). We also welcome the recent inception of the Concordat Implementation Group to improve the way that the careers of contract research staff in universities are managed and developed. It would seem to us, however, in the declared context of developing career paths to a variety of destinations and in improving the quality of career guidance, that employers' input to these activities should be sought.

In general, insufficient recognition has been given to the prospective needs of the user of the human capital outputs from higher education. In the first place, course design should take more account of the views of professional bodies and companies. Employers' views on accrediting, recording and measuring achievement (Recommendation 20: Progress File) also need to be considered. At the postgraduate level, R&D-intensive employers' concerns on laboratory skills must be heeded as a matter of urgency.

We ask that industry is involved in the development of quality assurance generally and that the system is extended to postgraduate degrees. Frankly, the standard of PhD training cannot be assumed to be uniformly high—there are quality problems in both the selection and supervision of candidates.

Proposals for a Research Equipment Loan Scheme: Revolving Loan Fund (Recommendation 34) and Related Issues in Funding Research Infrastructure

We have been vocal in drawing attention to the infrastructure funding deficit, and its consequences for our ability to recruit well-trained staff and to collaborate with world-class research groups. But, we do not agree that a shared fund is the way forward. Our basic objections to a loan scheme of this type (joint funding by public and private sponsors) are:

- we see no strategic advantage to us—and it would divert resources that we would otherwise focus on our preferred academic partners;
- although we do already fund infrastructure in strategic collaborations we believe that infrastructure provision is a government responsibility; and
- the solution to the infrastructure problem is greater selectivity. We are concerned that many institutions will not accept the unpalatable implications unless there is a strategic thrust very much bolder than that created by the portfolio of recommendations in the present Report.

While we disagree with the identification of companies as a source of these funds, we do endorse the importance of targeting infrastructure funds and the associated encouragement of sharing the facilities and of developing accountability. Any new initiatives must be directed so as to increase quality in the centres of excellence rather than to provide remedial money to rescue outdated/underperforming laboratories that have not been able to attract sufficient support from other sources. Moreover, the recipients must not only be high quality, but relevant.

Identification of relevance should be informed by user views and defined by national objectives—for example, aligning with the priorities mapped in the Foresight process.

There are several areas from which new money might be forthcoming:

- European Commission Fifth Framework Programme—funding for research infrastructure is specifically entertained in the thematic programmes proposed in the current draft for the next round of funding. The UK government initially opposed this proposal to provide core funding for infrastructural facilities, but it accepted that further analysis is needed to establish how to give effect to the Community's proper objective of effective exploitation of infrastructure. These policy strands need to be brought together.
- Millennium funding—the Lottery White Paper focuses on education, training, science, entrepreneurial activity and competitiveness. If the Government now perceives that funding of the university infrastructure, in pursuit of the national goals of improved quality of life and wealth creation, is a shared responsibility then the use of Lottery money to these ends would be highly relevant to the objectives that inspired the White Paper.
- Specific industry-university consortia to deliver research and training—as one example, healthcare companies and higher education institutions are coming together to build infrastructure for bioinformatics and, hence, drive teaching courses as well as research. Using matching public funds to facilitate these specific, goal-directed consortia might be a more effective way to build motivation among the external funders—capitalising on their priorities—than a more general revolving loans scheme.

Future of the Dual Support System

We agree with the Dearing Report recommendation that it is highly desirable for Government to find extra money to support research. We also support the redirection of some resources from the HEFCs to the Research Councils. However, we would not want to see abolition of dual funding unless there is a mechanism introduced to ensure that new research groups can be encouraged.

We agree that research funders, whether they are the Research Councils, companies or charities, should fully fund costs. But, in order to identify the indirect costs, it is necessary for the universities to be much more explicit and transparent in their calculations. Further discussion of these issues was presented in the recent Report on the Forum on Research Infrastructure for Health and Life Sciences (April 1997, chaired by Sir Colin Campbell and Professor Mark Ferguson). Inevitably, if the payment of overheads is to increase in the absence of additional money, the volume of research commissioned will decline.

Funding for Interdisciplinary and Collaborative Research Projects and the Sharing of Research Facilities

Our views on some of the key issues have been expressed in the previous sections.

We welcome the emphasis on the importance of encouraging interdisciplinary research. This was a major theme in our evidence submitted to the Dearing Inquiry (for example with regard to the interfaces between chemistry and the life sciences, clinical and basic sciences, biology and informatics). It is counterproductive that the Research Assessment Exercise penalises interdisciplinary research. However, the problems of anachronistic boundaries and outdated curricula are widespread.

We are optimistic that progress can be made, for example, as illustrated by the Foresight Chemicals—Health and Life Sciences Joint Action Group, which was constituted to examine issues at the chemistry-biology interface relating to innovation in the healthcare sector. It is also important, however, to examine the opportunities for extending an interdisciplinary approach in teaching. Recommendations 68 and 69 in support of collaborative research are also helpful in removing obstacles to the development of new partnerships that will maximise the opportunities to capitalise on the best research. Collaboration in teaching, scholarship and student support must also be actively progressed.

We welcome the recommendation that companies should take a strategic view of the relationship with higher education, applying the same level of planning as in our other operations (Recommendation 30). We already do this and we value highly the contribution made by R&D—whether internal or external—to our delivery of novel healthcare products and services.

Our strategic approach to the academic science base encompasses a range of collaborations, including individual studentships, consultancy agreements, research grants, Shared Equipment Initiatives, and leading participation in multilateral LINK schemes and Foresight Challenge awards. In these strategic collaborations we are providing intellectual as well as financial contribution and we emphasise that this is an internationally-competitive market. As a company operating globally, we will seek excellence in partnership, wherever it is to be found and we actively experiment with new forms of strategic collaboration (for example, elsewhere in Europe as part of the Framework Programmes).

We agree that it is highly important for students to gain work experience in research perspectives and techniques (Recommendations 18 and 19). While a variety of different types of opportunity are offered by SmithKline Beecham, it may be important to differentiate between the short-term (vacation) exposure exemplified by the description of the Shell scheme in the Report, that may principally offer cultural benefits, and the sustained training opportunity provided by undergraduate (sandwich) and postgraduate (CASE) studentships. SmithKline Beecham is one of the most active companies currently in providing sustained training of this type (approximately 120 sandwich studentships, 150 PhD studentships) and the provision of this training service exceeds our need to recruit. We agree that it is important for Government to encourage other employers to offer more work experience opportunities but it may be necessary to introduce fiscal incentives to achieve this goal.

Proposals for an Industrial Partnership Development Fund (Recommendation 34)

We are not entirely clear about the remit or working mechanism of the proposed new scheme. We assume that it would be an umbrella programme covering all the present array of industry—academia partnerships. We welcome efforts to simplify convoluted mechanisms and reduce bureaucracy, but would be concerned if:

- an overarching approach becomes monolithic and decreases the opportunities for experimenting with different forms of partnership;
- the regional emphasis is emphasised—geography must not be an obstacle to collaboration; and
- it repeats previous errors in imposing on industry without consultation.

Other Initiatives

Among the other points that we made in evidence to the Dearing Inquiry were:

- the importance of IT in course design and service delivery;
- the importance of vocational courses; and
- the importance of encouraging a greater understanding of business perspectives generally (and, hence, promoting entrepreneurship).

We are pleased to see the key recommendations emerge on these topics although, like Dearing, we are not entirely sanguine that each of these will be championed in the forthcoming debates, or that the international context will be fully appreciated. We ask that further analysis be started to share the experience of other countries, for example, as reported in the recent US Kellogg Commission on the evolution of High Education. Not least, the use of IT to deliver teaching and training from outside the UK will threaten to overwhelm the parochialism of some institutions.

Conclusion

Public policy for science and education in the UK is at a defining moment. The White Papers on schools, the Kennedy Report into Further Education and the Dearing Inquiry into Higher Education provide the new Government with the opportunity to develop innovative and coherent policies to sustain the rank of the UK among leading scientific nations and to educate a new generation for a world shaped increasingly by the accelerating pace of technology.

Dearing has identified a series of key problems. He has emphasised the importance of new and increased funding. His specific proposals may not provide all the required solutions. But they represent an important start. We now ask for further consideration to be given—as a priority—to identifying and reviewing other options for increasing intensity and selectivity in resource allocation to promote the excellence in research and training, which is vital to the future of UK competitiveness.

October 1997

APPENDIX 2

Memorandum submitted by the Institution of Electrical Engineers

The Institution of Electrical Engineers, with 140,000 members, is Europe's largest group of professional engineers. These members range from students to leading figures in industry, research and development and education. They work in the fields of power engineering, communications, electronics, computing, software, control and manufacturing. The implications of the Dearing Report will impact on a significant group of members.

INDEPENDENT ADVISORY COUNCIL

The Institution is concerned with the suggestion that a new independent advisory Council on National Research Policy be established and notes that Dearing is hesitant in making the suggestion. The IEE recommends that consideration be given to building a framework for the future based on Foresight Programme mechanisms.

RESEARCH ASSESSMENT EXERCISE

The IEE is concerned that the Research Assessment Exercise has focused all Universities on the importance of research with a resulting increase in activity in this area in the new Universities. Unfortunately the "dash for research" has distorted university priorities with the result that many students have received a diminished learning experience. Academics involved in research or consultancy should be encouraged to stimulate the teaching resource through the transfer of their experience. The next Research Assessment Exercise should seek for evidence that the research outcomes are reflected strongly in the teaching or in usage by industry. The Institution welcomes the recognition in the report of the need to inform and enhance teaching and the proposals for non-competitive funding to support research and scholarship which underpins teaching.

PUBLICLY FUNDED IT SYSTEMS

The Institution believes that many researchers lack awareness of what is available.

RESEARCH EQUIPMENT LOAN SCHEME

If the finance for such a scheme is available from the suggested sponsors then it is important to ensure funding is used cost effectively.

RESEARCH INFRASTRUCTURE AND THE DUAL SUPPORT SYSTEM

The Institution considers that the question of the dual support system is of lesser significance than the need, which Dearing identified, to ensure that the indirect costs of research are met by the research funding.

21 October 1997

APPENDIX 3

Memorandum submitted by the Chemical Industries Association

INTRODUCTION

1. The Chemical Industries Association is the leading body representing the UK chemical industry. The Association is the National Training Organisation for the chemical and process industries and, in partnership with the Association of the British Pharmaceutical Industry, runs the major awarding body for our industry's National Vocational Qualifications. The UK chemical industry spends approximately £400 million on training every year. Our industry is one of the UK's largest and most successful manufacturing sectors and it is strongly dependent upon the output from the higher education sector, as a source of highly trained recruits and leading-edge research expertise.

COMMENTS ON THE POINTS RAISED IN THE ENQUIRY

Proposals for an Independent Advisory Council on National Research Policy

2. The implementation of the 1993 White Paper on Science, Engineering and Technology has led to a more effective system of establishing research policy, with the increased focus on "user" needs within the research councils. Before the White Paper, there existed ACOST, the Advisory Council on Science and Technology, and the ABRC, the Advisory Board for the Research Councils. The White Paper proposed a new Council for Science and Technology (CST), and an advisory body for the new Director General of the Research Council. These, together with the Government Chief Scientific Adviser and the Director General for the Research Councils himself, were to form the main policy-making machinery. It is not clear to us, however, how this is working in practice. We had hoped that the advisory body to the Director General for the Research Councils would include senior industrialists with knowledge of research needs and their likely impact on industrial competitiveness. However, the proposed body does not actually exist, as far as we are aware.

3. ACOST, which provided advice directly to the Prime Minister, published numerous reports on various aspects of science and technology policy for external consultation. We are unclear as to whether the CST is intended to fulfil a similar role. Again, we are not sure how the system works in practice.

4. We would, therefore, welcome any move to establish a top level body, with teeth, which would:

- clarify the system of establishing policy at the most senior level;
- include senior industrial representatives; and
- provide continuity of advice through changes in government and ministerial responsibility.

Alterations to the Research Assessment Exercise and the Balance Between Teaching and Research

5. The Research Assessment Exercise (RAE) provides a necessary mechanism to ensure that limited funding is directed towards high quality research departments. However, because the RAE rating is so crucial to a department's funding status and, indeed to its future viability, there is an understandable drive within academia to maximise it, and a resulting temptation to neglect other aspects of an academic department's role, including teaching. The CIA has consistently stressed that high quality teaching in universities is at least as important as high quality research; the two are, of course inextricably linked. There should be a place in higher education for academics with particular talents in delivering high quality undergraduate teaching, but the RAE as it is currently implemented strongly discourages this. The system can also be dispiriting for young academics, often on short term contracts, who are faced with extreme pressure to publish research results, and make a positive contribution to the RAE rating, as quickly as possible, and it is often these young researchers who are faced with the heaviest teaching loads. Finally, there is a danger that the RAE could work against the encouragement of interdisciplinary research. The CIA has no empirical evidence for this, but we are aware of anecdotal evidence.

6. In light of these comments, we welcome the emphasis which the Dearing report has given to ensuring the provision of high quality teaching in universities, and the specific recommendation to set up a study on the factors (including the RAE) which might be working to help or hinder interdisciplinary research.

Proposals for a Research Equipment Loan Scheme—Funding for Research Infrastructure

7. The Dearing report has highlighted the parlous state of university infrastructure and research equipment. It seeks to glean funds from various sources to address the issue, including industry (for example through the proposal to establish a revolving loan fund). This is, however, tinkering at the edges of what has become a very serious problem. There is an urgent need for *government* to increase significantly its spend on university infrastructure.

8. Member companies of this Association fund an extremely wide range of contract and collaborative projects with universities, many of which involve a considerable financial contribution towards the purchase of equipment and infrastructure support. Such activity can only be sustained where the benefits can be justified in business terms. Basic, long-term research, which should be the focus of university research activity, cannot be sustained in this way. As we stated in our evidence to the Committee of Enquiry, government spending on research in universities, and on university infrastructure, is simply too low.

The Future of the Dual Support System and the Roles of the Research Councils and Higher Education Funding Councils

9. We reiterate the comments which we made to the 1996 OST Review of the Dual Support Transfer. The teaching and research roles of universities are mutually supportive, but nevertheless distinct. Consideration of funding through the Dual Support system should take account of this distinction, and be geared accordingly. Issues of financial neutrality apart, there should be a clear understanding of what constitutes support for infrastructure and what might be termed "a well-found laboratory", as opposed to support necessary to carry out effectively a specific research project through the research councils. With increased

funding for research underpinning our industry coming from private sources, there is a tendency for this distinction to be blurred, as was highlighted in last year's Coopers & Lybrand report on the Dual Support system. However, we do not believe that the emphasis of government funding, or mechanisms thereof, should be skewed because of this.

10. We support the Dual support system as it stands, because it has increased the awareness of the true costs of research (though perhaps not enough) among researchers and funding agencies. We welcome the fact that, under the current regime, the research councils have more freedom in the allocation of their support for high quality research (and high quality investigators). The decision to transfer funds from the then UFC to the research councils, should be seen as tacit recognition of the fact that there was previously a lack of understanding of the true costs of research: what was once deemed an indirect, infrastructural cost is now, rightly, considered to be a necessity for effective research council support.

11. In summary, we believe that the Dual Support system can be effective, and that the funding and research councils are fulfilling their appropriate roles. The problem is, as we have stated earlier in this Memorandum, that there is not enough government money directed at either of them.

Funding for Interdisciplinary and Collaborative Research Projects and the Sharing of Research Facilities; and Proposals for Industrial; Partnership Development Fund

12. Much research of value to industry is inherently interdisciplinary in nature. In our industry there is a vital need for effective integration of chemistry and chemical engineering, or materials science, for example. There remains a tendency, particularly in the UK, for such disciplines to be segregated within academia (with a few notable exceptions). We believe that the Foresight Programme is helping to address this weakness, but we welcome the fact that the Dearing report has recognised that more needs to be done, and particularly that there should be no disincentives for carrying out interdisciplinary research imposed by funding mechanisms.

13. With regard to collaborative research and the proposal to establish an Industrial Partnership Development Fund, we refer to our comments in paragraphs 7 and 8.

20 October 1997

APPENDIX 4

Memorandum submitted by the Association of University Teachers

1. The Associaton of University Teachers represents over 40,000 academic and academic-related staff throughout the United Kingdom. Modern academic employment depends to a greater extent than ever before on the ability of academics to conduct research and obtain research funding. Therefore, the recommendations of Dearing on research in higher education in England and Wales have direct and major implications for the AUT's members, and this memorandum can be taken to be the opinion of professional academic staff on those recommendations.

2. The paragraphs below respond briefly to the main points and recommendations of Dearing in relation to research in higher education in England and Wales.

PROPOSALS FOR AN INDEPENDENT ADVISORY COUNCIL ON NATIONAL RESEARCH POLICY

3. We agree with the Dearing Committee that research in higher education has suffered from the absence of an independent national body to oversee its development and to advise government. As the sources of funding for higher education have become more diverse and complex, the need for a unified overview has increased. It has become extremely difficult to understand the different functions of the many bodies involved in research funding and how they relate to each other. There would be great value in having a single independent body able to stand back from the complexity of the current arrangements and to make periodic judgements about their effectiveness, together with recommendations for their improvement. It would also be a welcome innovation to include the arts and humanities within the remit of such a body.

4. However, there is one fundamental respect in which we are strongly opposed to the Dearing Committee's recommendation. The suggestion that the advice of the proposed body should be given in private (para 11.106) is utterly unacceptable in this age of "open government" and the Nolan principles. It may be, as the Dearing Committee states, that public bodies are more frank when they give advice to ministers in private rather than in public (though this proposition is of course untestable in practice), but it also makes it impossible for the public to assess whether or not they are operating in a genuinely independent fashion. We need more not less openness and public accountability in research funding and policy formation. An independent body that gives secret advice is a political anachronism.

ALTERATIONS TO THE RESEARCH ASSESSMENT EXERCISE AND THE BALANCE BETWEEN TEACHING AND RESEARCH

5. We are strongly opposed to the recommendation of the Dearing Committee that departments rated below 3a in the RAE should receive no research funding but should instead be eligible for a per capita sum for individual research and scholarship in support of teaching. This proposal would lead to a further concentration of research funding within our higher education system. It is already the case that the lion's share of research support goes to a small minority of institutions. In the funding allocation resulting from the 1996 RAE, five universities received almost one third of the available funds; and 12 universities now receive over 50 per cent of Research Council funding.

6. We believe that the concentration of research funds has gone far enough. The policy may have had some limited success in protecting some of our centres of research excellence from the worst effects of expenditure cuts, but in recent years it has done more harm than good.

7. The spread of research talent and potential is far wider than the concentration of research support would suggest. We are rapidly losing the flexibility to encourage talent wherever it is to be found in the system. Because success in the RAE has come to a very significant extent to determine the ability of researchers to attract support from other sources (Research Councils, charities, industry etc) many excellent researchers in departments with relatively low RAE sources have little chance of ever fulfilling their potential. They simply have no way of getting their research to the point where they can attract funding. In our evidence to Dearing we advocated the setting up of a "seedcorn" fund to be made available on the basis of open competition to researchers in departments graded 1 and 2 in the RAE.

8. However, we make no apologies for insisting that this must take the form of additional funding. The Dearing Committee's idea that departments graded 3b and below should lose their research funding and then share out the £30 million saved in the form of £500 or so per member of staff to support "private research" is frankly laughable. This proposal simply serves to highlight the pointlessness of attempting to reverse the worst deprivations of over 10 years of the RAE by reallocating existing resources.

THE AVAILABILITY OF AND ACCESS TO PUBLICLY-FUNDED IT SYSTEMS BY RESEARCHERS AND OTHERS

9. The Dearing Committee did not have time to look in any detail at the very complex technical issues involved in ensuring that academic researchers have easy access to high quality IT systems, such as SuperJANET. There are a number of possible solutions to the problem of the ever-increasing load on the current networks (the problem of "bandwidth"). Some of these are mentioned by Dearing and some support is given to the idea of introducing charges on a volume of use basis. We see a need for much more investigation about the implications of this solution before any decisions are made. We therefore support the recommendation that the Joint Information Systems Committee should be asked to report within a year on the available options (rec 28).

PROPOSALS FOR A RESEARCH EQUIPMENT LOAN SCHEME

10. The Dearing Committee was absolutely correct in identifying the deterioration of research equipment, resulting from capital funding cuts, as an area requiring an immediate response. However, there are a number of problems with the suggested revolving loan fund of £400 to £500 million financed jointly by public and private research sponsors (rec. 34). First, for the reasons against further concentration of research funds that we have already given, we are opposed to the restriction of any loan fund to the support of a limited number of top quality research departments. Any fund should be designed to assist promising new research initiatives in a wide range of departments and institutions. Also, consideration should be given to prioritising the supporting of research facilities which are designed to be accessible to researchers regionally or nationally, rather than being solely institutional. Second, we are doubtful of the ability of such a loan fund to attract finance from private sponsors. Universities already have a great difficulty in securing the full indirect costs of the research that they carry out on behalf of private sponsors (mainy charities and industry) and it is not at all obvious that the private sector will be very eager to contribute to the Dearing Committee's revolving loan fund. We would not want to reject this proposal out of hand, but it certainly needs looking at in much more detail than is contained in the Dearing Report. Also, it goes without saying that we would prefer additional public funds for research equipment rather than a loan scheme.

FUNDING FOR RESEARCH INFRASTRUCTURE

11. The Dearing Committee has accurately described the current "funding gap" in UK higher education research, the extent to which we are lagging behind competitor countries and the consequences of allowing this situation to continue. There is now good solid evidence for a close causal relationship between investment in research and development on the one hand and economic performance on the other. The success of the Prime Minister's commitment to the modernisation of Britain must surely depend on the establishment of a strong R&D infrastructure. Higher education institutions not only provide most of the nation's basic research and much of its applied research, they also train the research workforce itself. One of the most disturbing comments in the Dearing Report comes in paragraph 11.7:

"Despite the lack of investment, the international standing of UK research, as measured by the frequency with which it is cited by others, has remained competitive. It is likely, however, that the UK's recent success in scientific research reflects past levels of expenditure. Recently, the UK has seen a decline in its share of world publications and citations, which indicates that it may be falling behind."

12. If this is right, it may be that the crisis in higher education research still lies ahead. We can see no way of averting it that does not entail a significant, immediate injection of additional public funds.

The Future of the Dual Support Funding System and the Roles of the Research Councils and the Higher Education Funding Councils

13. We agree with the Dearing Committee's arguments in favour of retaining the dual support system (paras 11.23–11.25), with the provisos that we have made about the need to begin to reverse the excessive concentration of funding brought about by the RAE. The argument that Funding Body research support provides the only way of funding the unconventional or unfashionable field, or the unknown researcher who does not yet have the reputation to complete successfully for Research Council grants, is conclusive as far as we are concerned. It is of course precisely the weakening of this function that underlies our opposition to the current RAE.

14. Any further transfer of significant funds from the Funding Body to the Research Council side of dual support, combined with a continuation of the current selectivity policies, will effectively sound the system's death knell. The remaining element of flexibility in the research funding system—its ability to provide the traditional "well-found laboratory"—will disappear to be replaced by a system in which access to research support will be restricted to the established researchers and institutions.

15. We agree with Dearing that the Research Council grants should cover the full value of indirect costs, but the current £110million shortfall must come from additional resources, not by emasculating the Funding Body contribution to higher education research.

Funding for Interdisciplinary and Collaborative Research Projects and the Sharing of Research Facilities

16. Our members still complain that the RAE discriminates against interdisciplinary research despite the attempts in recent exercises to counteract this tendency. We agree with the Dearing Committee that it is time to look closely at the evidence for this claim and therefore support the recommendation that an inquiry take place in time to inform the next RAE (rec. 32). Since much the same debate is heard in respect of collaborative research, we would suggest the expansion of the terms of the proposed inquiry to include collaborative research and the sharing of research facilities.

Proposals for an Industrial Partnership Development Fund

17. We believe that the Dearing Committee's recommendation for an IPDF has considerable potential for widening the opportunities for university/industry research partnerships. As the Committee points out, the RAE is not good at assessing applied research carried out in close partnership with industry. We would add that industry is not always very good at making use of the research and development opportunities available at their local or regional higher education institutions. One of the prime functions of an IPDF should be the active promotion of local and regional partnerships and the development of a national introduction service which would use information databases to match industrial research needs with institutional expertise.

Other Issues: Contract Research Staff

18. We are deeply disappointed that the Dearing Committee gave such scant attention to the problems of contract research staff in higher education. The Committee notes the nature of the problem (para 11.93) and some of the recent attempts to respond to it (para 11.94) but offers no fresh analysis or recommendations. We believe that it is now time for a full review of this issue which has not been looked at closely since the House of Lords Select Committee report on academic research careers in 1996.

20 October 1997

APPENDIX 5

Letter to the Clerk of the Committee from Professor P N Wilson, CBE, General Secretary, The Royal Society of Edinburgh

The Royal Society of Edinburgh has been an active participant in the National Committee of Inquiry into Higher Education, submitting written evidence to the main committee and the Scottish Committee plus Oral Evidence to the latter. The Society was pleased to note that several of the specific suggestions made in its earlier submissions had been incorporated in the Committee's Recommendations and has now submitted its views on the outcome of this inquiry to the Scottish Office. A copy of this submission is enclosed for the Select Committee's consideration and I would also like to take this opportunity to draw a number of key points to their attention.

The Society welcomes the recognition of the achievements made by Higher Education in the UK over the last 30 years. In particular, the Society shares the Committee's concern that any further reductions in the unit of funding would damage both the quality and effectiveness of higher education including the research necessarily associated with teaching and learning in the universities.

The Society endorses the Committee's view that additional funding is needed to respond to these problems and to close the serious and worsening funding gap which already exists. The Society considers it imperative that any additional funds raised by reducing maintenance grants and by the payment of fees by students are returned directly to higher education preferably directly to the individual HE institutions. As in other aspects of funding, it is essential in order to retain the confidence of all those involved that funding details should be transparent.

The Society welcomes the acknowledgement of the distinctiveness of Scottish education, the recommendations to improve access to, and widen participation in, higher education, and the importance given to learning throughout life. The Society endorses the recommendation of the Scottish Standing Committee to the Secretary of State that the financial contributions from Scottish graduates for qualifications gained in Scotland should be equitable with the contributions for comparable qualifications gained elsewhere in the UK; otherwise students might be attracted to courses elsewhere less appropriate to their abilities.

I would also like to express the Society's concern at the Select Committee's terms of reference which refer to "higher education institutions in England and Wales". Whilst we recognise the distinctive nature of higher education in Scotland, as noted in the previous paragraph, we are most anxious that the Select Committee should take a truly national perspective. Indeed, the Society in its comments to the Scottish Office, recognised that, at present, Research Council funding allocated on the basis of specific research grant proposals submitted has to be considered in competition across the whole of the UK, and the Society considers it desirable that this arrangement should continue and that Research Councils should remain UK wide and continue to award funding on the basis of research excellence.

That said, I would like to draw your attention to the Society's support for the proposal to form a Scottish Forum for Higher Education (in which the Society would hope to play a leading role) in connection with the Select Committee's interest in proposals for an independent advisory council on national research policy.

I would also like to draw your attention to our comments on the Research Assessment Exercise on page 3 of the enclosed document[1, 2].

We shall be interested to hear the outcome of the Select Committee's inquiry. In the meantime, if you require any further information, please do not hesitate to contact either myself or Catherine Lyall, the Society's Head of Activities.

18 October 1997

APPENDIX 6

Memorandum submitted by the UK Life Sciences Committee

INTRODUCTION

The UK Life Sciences Committee (UKLSC) has been formed recently by 12 learned societies in the molecular, cellular and physiological life sciences (see Appendix) and represents some 30,000 biological scientists. UKLSC will co-ordinate and enhance initiatives taken by member societies in areas such as science policy and funding, professional matters and career development, education at all levels, and public appreciation of science. Because this area of biology has grown so rapidly there is a number of small societies representing specialist interests. Coming together through this new committee will enable these societies to speak with a single voice to government and other policy and decision makers.

PROPOSALS FOR AN INDEPENDENT ADVISORY COUNCIL ON NATIONAL RESEARCH POLICY

1. UKLSC would welcome the establishment of such an Advisory Council provided that it is not used as a means of postponing the urgent decisions that are needed to prevent the collapse of the science base. Opportunity should also be taken to rationalise the number of bodies that already exist in an advisory

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[1] Not printed.

[2] *Note by witness:* Caution will have to be exercised over the implementation of the Dearing recommendations to encourage institutions to make strategic decisions about whether or not to enter departments for the Research Assessment Exercise. This could result in risk-averse higher education institutions being unwilling to expose some departments with research aspirations to the uncertain financial outcome of the re-organised Research Assessment Exercise. The pool of usable research might thereby be reduced, to the economic and other disadvantage of the nation.

capacity. It will be important for the proposed Advisory Council to support and promote all four distinct purposes for research in higher education identified by Dearing (Summary, paragraph 52).

2. The 1993 White Paper "Realising our Potential" marked a shift from the Haldane principle that Research Councils (RCs) should choose which research to support based largely on the quality of the science, and placed additional emphasis on relevance to wealth creation and the quality of life. Placing the RCs under the control of the OST and the Director General of Research Councils increased government ability to steer the direction of research in line with its policy objectives, and to "top-slice" funding for managed initiatives from RC budgets. An important function of the Advisory Council will be to judge whether or not these activities, and other pressures, have shifted the balance of university research too far from basic to strategic and applied research, and to ensure that the balance is appropriate in future.

3. The Advisory Council is also required to ensure that the two arms of publicly funded research, the RCs and higher education funding councils (HEFCs), work together, since they have different principles for allocating funding. An earlier review by the Commons Science and Technology Committee concluded that the Science and Engineering Base Co-ordinating Committee was not performing this liaison role satisfactorily. The Council must ensure that only the best work is funded, in whichever universities it is located, and resist pressures for "democratic" distribution of research funds.

4. Whilst being independent, the Advisory Council must have assured access to the highest levels of Government if it is to act with authority.

Alterations to the RAE and the Balance between Teaching and Research

5. UKLSC considers that some form of RAE is the most appropriate way of achieving selectivity in funding for infrastructure. More quantitative performance indicators are needed, together with international panel members as recommended in the Dearing report to judge international competitiveness, and the administrative burden of the RAE needs to be reduced. Much will depend on the consultation document being prepared by HEFCE. It should be noted that the use of "impact factor" as a performance indicator has led many university departmental managers to push researchers towards publishing in American journals at all costs, to the detriment of smaller, specialist, UK journals and the subject societies that support them. Mechanisms are also needed to enable groups to be assessed and supported, rather than whole departments. Assessment panels should rank groups, initially on quantitative, auditable measures, followed by exercise of judgement as a moderating element; feedback from the 1996 RAE suggests that it worked the other way round.

6. There is support for Dearing's concern about the effects of the RAE, as currently performed, on interdisciplinary research, and a solution to this must be found. Furthermore, different institutional structures may not map well on to the discipline-based RAE assessment panels. This applied particularly to biochemistry and biological sciences in the 1996 RAE. More effort is needed to ensure that panels in adjacent disciplines give due weight to interdisciplinary research and adopt consistent procedures.

7. The concept of per capita funding for scholarship for staff in deparments that concentrate on teaching and do not submit themselves to the RAE appears sensible, but money should not be taken from the research budget for this purpose. If the maintenance of good quality higher education level teaching requires funding for scholarship then this is a quite proper overhead on teaching and should be funded as such from the teaching budget. There is some debate as to whether the RAE has tipped the balance too far towards research at the expense of teaching, the experience probably depending on departmental policy at different instiutions. Certainly, it is likely to be the case that students have less exposure to researchers as departments tend to organise staff into full time teaching or research in the interests of efficiency for fulfilling RAE objectives.

The Availability Of, and Access To, Publicly-Funded IT Systems by Researchers and Others

8. There is very strong support for the Dearing proposal that IT, and especially communications, should continue to be provided by HEFCs through the Joint Information Systems Committee, and for the provision of sufficient protected international bandwidth. Funding needs to be available to allow regular upgrading of systems. The importance of databases for modern research in the life sciences cannot be exaggerated, and the ability to retrieve rapidly substantial amounts of data is a necessary part of this. More generally, e-mail and the internet have greatly aided collaboration and information transfer, and increased the cost-effectiveness of public sector research. The importance of these facilities is so universal that they should be provided by HEFCs rather than through RCs as part of research grants, for example. It is important that any mechanism for charging should not be wastefully bureaucratic.

Proposals for a Research Equipment Loan Scheme

9. The recognition by Dearing of the dire situation in UK universities with regard to modern equipment is welcome. The proposal for a research equipment loan scheme is fine in principle, but industry made clear its objection to paying into a general fund over which it had no control, and from which it received no individual benefit, both during the sitting of the Dearing Inquiry, and since the publication of the report.

Substantial funding from industry and charities appears unlikely without some form of government incentive, and the government must have contingency plans to make more public funding available.

10. The practical aspects of the scheme also do not appear to have been sufficiently thought through. The suggestion that the loans could be repaid through the proposed increased indirect cost elements of RC grants does not take full account of the fact that RCs fund only about one third of university research. Charities do not normally fund indirect costs, whilst it might be difficult to persuade industry to give money to the loan pool and at the same time provide increased overheads for repayments.

11. This scheme considers only research equipment, yet a recent report from Manchester University, funded by HEFCE, found that the situation is at least as bad for teaching equipment. It has often been noted that graduates joining biotechnology and pharmaceutical industry encounter equipment of which they have no knowledge or experience because of the poor provision in universities. Universities are in this respect falling short in providing trained manpower for the nation's workforce.

Funding for Research Infrastructure/The Future of the Dual Support Funding System

12. Again, the recognition by Dearing of the potentially disastrous state of infrastructure in universities is welcome. UKLSC supports Dearing's recommendation that the dual support funding system should be retained, for the reasons discussed in chapter 11 of the Report, and in chapter 5 of the POST publication *The future of research dual support in higher education.* The strains on the existing system are well recognised, but it is important that universities should have funds with which to develop their research strategy, to initiate new, speculative developments, and to help to support inexperienced researchers, and others between grants. A mechanism needs to be found to provide reasonable employment contracts for essential technical staff, who are so important to the national research effort, rather than 'hand to mouth' funding based on direct cost contributions from grants.

13. The current situation requires an immediate injection of funds through HEFCs, and a long-term programme of renewal, to overcome the backlog of under-investment in equipment and infrastructure. This must be accompanied by improved mechanisms to ensure that full indirect costs are met in future. It is essential that universities improve accountability, transparency, and devolution of funding for infrastructure awarded by HEFCs, and that researchers learn to prepare grant applications more professionally to avoid under-estimating indirect costs.

14. The proposed increase in RC grant overheads to 60 per cent is reasonable, but only if additional funds are made available so that research volume is not reduced. The molecular life sciences represent major growth opportunities in both academic and applied research for the next millennium and this growth will require increased funding. The UK is acknowledged to be world class in this area of science. Without increased funding it is likely that the UK will cease to be an attractive site for industrial development in the biosciences. Furthermore, data show that the UK still invests a relatively small amount of GDP in R&D, compared to most G7 nations (Report, chapter 3). UKLSC would not recommend a second transfer of funds from HEFCs to RCs as this would not reduce the funding gap, but would reduce the flexibility of universities to undertake regional and local initiatives.

15. The Medical Research Charities have done much to save UK biomedical researchers from the real depredations that have hit other areas of science. Discussions between the government and charities continue on the issue of funding indirect costs, but UKLSC considers that any attempts to compel charities to pay these would be counter-productive. One possibility worth considering would be for indirect costs of charity-funded research to be an explicitly identified part of HEFC research funding. A solution to the problem must be found in order to protect those groups/departments that are largely funded by charities and are currently not being paid for the full cost of their research.

Funding for Interdisciplinary and Collaborative Research Projects, and the Sharing of Research Facilities

16. In its present, strictly discipline-based form, the RAE does nothing to encourage interdisciplinary research and may even discourage it. It is important that this is addressed in the forthcoming HEFCE consultation paper on the RAE.

17. As far as the RCs are concerned, funding for collaborative research seems to be on a par with that for single groups, but there can be difficulties when inter-disciplinary research crosses the boundaries between the RCs. The new MRC funding model based on collaborative groups, and the proposed BBSRC Structural Biology Initiative, both put a high premium on collaboration and sharing of facilities, and this is to be welcomed. But there is concern that the MRC scheme does little to encourage collaboration between institutions (as compared to within institutions), that it will be difficult for isolated units working on integrative biology to organise into co-operative groups, and that by focusing funding in about 80 co-operative group grants MRC will increase the concentration of research in a small number of elite institutions irrespective of the fact that excellent research is performed in smaller departments. A continuing review of inter-disciplinary research and of shared facilities is recommended.

18. It is unreasonable to expect that the injection of funds to update equipment and unfrastructure called for in item 13 could meet the expectations of all universities. Because of the cost of state-of-the-art equipment it will be necessary to concentrate facilities in particular universities and encourage shared use on a regional basis. The awarding of infrastructure funds should, perhaps, be provisional upon universities stating the strategic role of the laboratories in relation to other nearby institutions. Funding must aim to extend inter-university collaborative research by supporting not only the capital costs of equipment but also the costs associated with provision of facilities to other universities, notably those of the necessary expert technical support. The RAE has progressively reduced DevR funding, which affects particularly the post-1992 universities that aim to develop research capability. It is important that talented researchers in such institutions should have the opportunity to use shared equipment, and to develop collaborative research with groups in better equipped laboratories.

Proposals for an Industrial Partnership Development Fund

19. It is clear that the current proliferation of schemes for promoting research collaboration between universities and industry can be confusing, and the idea of a single dedicated funding stream is welcome. However, it is a matter of some concern that the remit of this funding stream refers only to the encouragement of applied research, although this may not be what the Report intended. Industry supports a substantial amount of strategic, rather than applied, research in universities. Indeed, it could be argued that this is the appropriate role for industry-university collaboration, and that applied research is better performed by industry. The Government was implicitly criticised in the Dearing Report (paragraph 11.71) for introducing new award schemes involving shared costs with industry, without consulting industry. Furthermore, the method of assessment of applications for some of these awards has been criticised by the Royal Society and others (see pages 37–38 of the POST report). The introduction of the Industrial Partnership Development Fund should help to avoid these criticisms in future.

20. There was concern from some quarters that the RAE does not recognise sufficiently well work performed in collaboration with industry. The proposed Development Fund will go some way towards ensuring that such work is adequately supported in future. Furthermore, by providing a clearer focus and removing bureaucracy the Fund may make it easier for small to medium sized enterprises to identify new ways to engage in collaborative work with universities.

Members of UKLSC

The Physiological Society
British Biophysical Society
Society for Endocrinology
Biochemical Society
Anatomical Society
British Society for Developmental Biology
British Society for Immunology
British Society for Cell Biology
British Pharmacological Society
British Electrophoresis Society
Genetical Society
Nutrition Society

21 October 1997

APPENDIX 7

Memorandum submitted by The Royal Society of Chemistry

1. The Royal Society of Chemistry represents 45,000 chemists of whom all but 8,000 are resident in the UK. Its membership spans both higher education institutions and the many sectors of industry which make use of chemistry and employ chemists. The Society has already commented on the Dearing Report to the Secretary of State for Education and Employment and the President of the Board of Trade; copies of letters dated 8 September and 7 October 1997 are being submitted with this memorandum.

2. The Committee's inquiry relates to university research. However, many industrial employers amongst the Society's membership say what they value most from universities are well educated people. In chemistry, training in research is an essential part of the educational process for a significant number of students. Because of the linkage between teaching, training and research, our evidence relates to all these aspects.

3. Three types of education in chemistry are required:

- Education of those intending to practise chemistry at the full professional level (in Dearing's terms, higher honours graduates), a proportion of whom will require postgraduate, including research qualifications;
- Courses specifically intended to educate and train technicians to a high level of practical competence in the subject; and
- Generalist courses designed to give enough scientific understanding to enable graduates to fill a wide range of posts in industry and commerce.

These requirements can only be met by a real diversity of provision within the higher education system. The Society believes it is essential that resources for teaching and research be concentrated in a more effective manner. We believe that a range of clearly defined and different missions and purposes are necessary in the higher education system.

4. Because diversity of provision is essential, a major disappointment in the Dearing Report is the absence of mechanisms for ensuring that the sum of decisions made by institutions meets national needs. At present decisions about course and research provision are taken by individual institutions in an environment of competition for students. It appears that the emphasis of course provision in chemistry is now on the more academic type of course, often presented in a range of relatively minor variants designed to attract students to the neglect of other necessary types of courses, for example, courses with an emphasis on plant operations or on analytical instrumentation. A significant proportion of the student intake might well be better suited for courses of the latter kinds.

5. In the absence of any system of national planning, it would appear that diversity of provision can only be assured by the use of the funding mechanisms which need to be more sophisticated than hitherto. We support the concept of multiple funding streams for the support of research, scholarship and teaching as outlined in the Dearing report (paragraph 11.101), in particular the maintenance of the *dual-support system* for research. However, in practice, the research assessment exercise and the consequential funding so dominates thinking, that there is a danger of the higher education system becoming less, rather than more diverse.

6. With rare exceptions, the infrastructure in higher education supports both teaching and research, albeit to varying extents; hence the term *"research infrastructure"* is simplistic. The precise balance of provision should depend upon the mission of a particular institution. While centres of research excellence require a wide range of highly sophisticated equipment at the forefront of technology, which will be of limited application in teaching below the postgraduate level, all institutions, not least those concentrating on the training of high level technicians need to be resourced to a standard comparable to that usual in the broad spectrum of industry in which their graduates and diplomates will find employment. Specialist accommodation and equipment in the universities need to be maintained to the same high standards as in industry. This is sadly not the case at present.

7. Much research in chemisty is now centred on the use of complex and costly instrumentation, the efficient operation of which is crucially dependent upon the quality of the personnel operating it and so providing effective support for the researchers using it. The role of technicians trained to graduate standard is crucial in this regard. Although individual brilliance will still result in major research breakthroughs, most competitive progress will depend increasingly on multidisciplinary teamwork. Significant increases in *collaboration* within and between institutions in the conduct of research and in the *sharing of research facilities,* will only be possible if technicians of the highest quality are available to operate and maintain such facilities. At present, the HE system does not produce sufficient numbers of technicians of the appropriate quality. Nor does the system itself have the resources to recruit them through the capacity to pay competitive salaries or to invest in their continuing professional development.

8. Successive *research assessment exercises* (RAEs) have identified research of high quality and have enabled resources to be focused increasingly selectively, however they have not been concerned directly with the quality of the education and training provided for research students. While excellence in research has led to substantial additional funding, excellence identified by the teaching assessments has not; hence there has been a shift in the *balance of research and teaching* with a disproportionate concentration of effort on preparation for the RAEs to the relative detriment of the teaching function.

9. The Society is concerned that education and research and the associated training should be of the highest quality. An appropriate proportion of the time of the best researchers should be given to stimulating undergraduate and postgraduate students. It believes that the new Quality Assurance Agency shares these concerns.

10. The attainment of many of the objectives set by Dearing will only be possible if collaboration between institutions and complementarity of provision in research and teaching replaces the present emphasis on competition which should be limited to striving for the highest possible quality within a multiplicity of provision. The Society has an unrivalled series of networks which it believes can be better used not only by the UK chemisty community, but also by government and its agencies in satisfying the balance of national needs identified in the Dearing report. The Society is currently conducting relevant studies, the preliminary outcomes of which it will be happy to share with the Committee.

21 October 1997

APPENDIX 8

Memorandum submitted by Professor John Bridgwater FEng, Department of Chemical Engineering, University of Cambridge

INTRODUCTION

For the last four years I have been Shell Professor of Chemical Engineering and Head of Department at the University of Cambridge. Previously I was Head of the Chemical Engineering Department and Dean of Engineering at the University of Birmingham. Currently I am President of the Institution of Chemical Engineers. This evidence is provided, however, in a personal capacity.

My major responsibility is promoting the vitality of teaching and research in my Department. I maintain an active research group of some six to eight concerned with the design and processing of particulate materials. It is an area once thought abstract by industry but it is now central to new processes and products in the chemicals, pharmaceuticals and materials industries.

SUMMARY OF ISSUES ADDRESSED

1. Industrial competition for staff is severe.

2. Need to manage gaps between Research Councils.

3. Intellectual Property Rights—issues can waste much academic staff time.

4. Safety—a vital and expensive issue.

5. Applied research—muddled view and recommendations.

6. Research Assessment Exercise—panels should not work in isolation, international membership is doubtful.

7. Company Commitment. Offer tax incentives?

EVIDENCE

1. *Industrial competition for staff*

The Cambridge Chemical Engineering Department graduates about 60 students a year from its undergraduate course who are extremely popular with industry and few choose to leave the discipline. These students are motivated to pursue careers in industry with starting salaries of typically £20,000 which then rise rapidly. The number that choose to undertake a doctorate is typically three to four per annum. The Department graduates about 20 PhD students per annum of whom two-thirds are British/EC. Some come to us from other UK Chemical Engineering Departments but we also welcome graduates from other disciplines. On completing PhD, over 80 per cent take industrial jobs. The discipline is very successful and there is naturally an urgent need for complementary research work to underpin the businesses. However, the provision of university personnel at all levels is difficult because of the very industrial success.

2. *Management of gaps between Research Councils*

Chemical Engineering grew out of the oil and chemicals industries and developed methods for the manufacture of modern materials of all types in an economic, safe and environmentally acceptable fashion, which takes full account of life-cycle analysis. The discipline thus relates both to the Engineering and Physical Sciences Research Council and the Biotechnology and Biological Sciences Research Council (eg food and drugs). It also has some considerable relevance to the rapidly developing area of manufacture of human body parts. The link comes since the processes of heat of fluid flow and mass transfer are central to human organ growth; this brings with it a potential MRC link. I am concerned that the split Research Council organisation may work counter to the best interests of research and of the industrial communities.

3. *Intellectual property rights (IPR)*

This does figure in the documentation I have read. Getting companies to work together in groups causes enormous amounts of time to be wasted. There is a grant in my own Department which is now operating, but, since the Joint Industrial Agreement remains unsigned, industrial funding is not released to provide the secretary desperately needed by the grant holder.

4. *Safety*

The impact of health and safety legislation on departments' cost is not prominent in the Report yet the operational and financial consequences are considerable. On research grants, we recover the monies spent but the general safety requirements and provison of staff to adminsiter it has drawn considerably on resources. Safety leads to considerable problems with modernising buildings and laboratories.

5. *Applied research*

Dearing (eg para 11.71) is confused about applied research. Indeed, the Report seems to rest on the simple but disproved hypothesis that knowlege obtained from scientific advancement, leads to development, which leads to human benefit or economic gain. The process is not linear; rather the three are intimately intertangled. Unsolved industrial problems on the demands of new products stimulate new ideas for research of the most demanding intellectual character.

I was concerned to read that important funadmental schemes such as Cooperative Awards in Science and Engineering and Realising Our Potential Awards, were to be swept up into IPDF. It strikes me IPDF should be much influenced by DTI policy and IPDF should capture just that cash flow.

6. *Research Assessment Exercise*

Within Chemical Engineering there is some concern about the rankings. These were low and arose since HEFCE declined to allow any process of review and normalisation. This has been damaging to Chemical Engineering nationally.

I would myself have much preferred to see a Panel membership that was dominated by workers currently active in universities; only two of the five members of the Panel were active in Universities.

I am sceptical about international membership. It is surely logical and correct for UK Nationals to be responsible for the distribution of UK money. In my own subject an international representation is likely to come from United States. However, the same subject title conceals a discipline of substantially different character, the US field containing significant themes which we would place in Applied Mathematics or Physical Chemistry departments. One possibility is for international figures to give a view on the ranking of journals.

7. *Company commitment*

Would it not be desirable to require companies to report on their commitment to research in universities, say in their accounts? Would it not be possible to give tax incentives to promote both research and support of research infrastructure? I doubt that government will ever cope with the need.

21 October 1997

APPENDIX 9

Memorandum submitted by the Natural Environment Research Council

INTRODUCTION

1. The Natural Environment Research Council is the UK lead body for research, survey and monitoring on all aspects of the environment and its resources, and invests approximately 45 per cent of its net annual grant-in-aid in universities. The remainder is invested in NERC's own Centres and Surveys which play a complementary role to the universities and work in close collaboration with them.

2. NERC support to universities includes funding for studentships (c.1,000 PhD, 250 Masters (MSc/MRes); research units; research grants; fellowships (postdoctoral, advanced, senior and professorial); and infrastructure (analytical facilities, equipment pools, major national facilities such as Royal Research Vessels, aircraft, satellite instruments and high performance computers). The support is invested in departments of mathematics, physics, chemistry, biology, engineering, earth sciences, oceanography, meteorology, geography, environmental sciences and archaeology, reflecting the cross-disciplinary nature of the sciences of the environment.

Response to the Specific Issues to be Addressed by the House of Commons Science and Technology Committee

(i) *proposals for an independent advisory council on national research policy*

3. The need for an independent body is unclear. The report of the National Committee of Inquiry into Higher Education (NCIHE) did not have time to investigate the roles and functions of the existing Science and Engineering Base Co-ordinating Committee (SEBCC) and Council for Science and Technology (CST). NERC suggests that these two bodies should meet together at least once a year to enable the executive and non-executive arms of science policy to engage in discussion. In our view this would obviate the need for establishing a new body.

(ii) *alterations to the Research Assessment Exercise and the balance between teaching and research*

4. Most of the research supported by NERC is interdisciplinary. The RAE is not designed to encourage such collaboration and NERC would like to see an evolution of the exercise that allows or encourages these interactions. On the whole we find that the present RAE system reinforces the discipline boundaries and therefore works against our aims. This is a real problem and needs addressing.

5. NERC welcomes the emphasis in the report on selectivity and supports the proposal for inclusion of international members on Research Assessment Exercise (RAE) Panels. Not all universities in the UK can expect to be funded to carry out cutting edge research, especially where expensive infrastructure is required. However, because NERC invests its research funding in individuals or groups rather than Departments, we would wish to retain the flexibility and dynamism that arises from funding, where appropriate, individuals in Departments of lower rank than 3a. These individuals would, of course, be of outstanding international quality, otherwise they would not be successful in the highly competitive peer review system operated by NERC in which only one in five applicants is funded.

6. While in principle supporting the idea of a *scholarship fund*, NERC has concerns that the proposals, as framed by the NCIHE, will need to draw on existing funds for research. If implemented the scholarship fund should embrace the mechanisms of assessment, allocation and quality assurance that are as comparable, rigorous and transparent as the RAE exercise and the Research Councils' peer review procedures.

(iii) *the availability of, and access to publicly-funded IT systems by researchers and others*

7. The existence of a high quality national network of IT infrastrucure is vital for the day to day working of the UK higher education and Research Council communities, and NERC welcomes the proposal that the Joint Information Systems Committee report on options to provide sufficient protected international bandwidth to support UK research.

8. NERC has concerns about the idea of introducing charging for services and finds the report lacking in detail as to how this would operate.

(iv) *proposals for a research equipment loan scheme*

9. While fully endorsing the identified requirement for greater investment in research infrastructure (see below), NERC feels that greater elaboration is required on what a loan scheme would entail. NERC could not contribute to such a fund without additional resources.

(v) *funding for research infrastructure*

10. NERC endorses the NCIHE report's call for additional public investment in both buildings and equipment. The Joint Research Equipment Initiative (JREI) has provided some additional support but has required matching of public funds with private sector investments. Whilst this is a desirable objective, it must be recognised that not all areas of science are equally likely to secure industrial partnership funding. It is NERC's experience that within its portfolio some areas (eg earth sciences) have benefited from the JREI more than others, of equal importance. NERC would like to see this scheme expanded to allow funds from the public sector (eg local authorities, Environment Agency) become eligible as the matching contribution.

11. A complementary approach to providing further infrastructure for universities is the NERC scheme of establishing national services and facilities through contracts to universities. NERC supports over 20 of these and achieves greater usage of equipment, analytical facilities and other generic infrastructure than could be achieved through award of equipment grants to individuals.

(vi) *the future of the dual-support funding system and the roles of the Research Councils and the Higher Education Funding Councils*

12. NERC supports both the general principle that scientific research in universities requires the plurality of funding provided by the dual support system, and the suggestion that Research Councils should pay the full costs on research grants. However, NERC emphatically rejects the possibility of providing additional overhead costs without new resources. If the overheads were provided from within existing resources, this would lead to an unacceptable decrease (of about 25 per cent) in the volume of university research supported by NERC.

13. The proposed increase in overheads should also lead to a more transparent accounting system in which the true costs of research in universities are fully identifed.

(vii) *funding for interdisciplinary and collaborative research projects and the sharing of facilities*

14. Interdisciplinary research is key to NERC objectives (see also the response to question (ii)). Many of the most important innovative advances in science occur at interfaces between disciplines, for example between physics and biology, and involve collaborative research.

15. NERC encourages inter-institutional collaboration through a number of funding schemes and many of the Council's notable successes in advancing knowledge and understanding have resulted from the synergy of individuals and research groups working within thematic areas eg the Universities Global Atmospheric Modelling Programme. These mechanisms and schemes provide added value at the intellectual level and through the sharing of expensive or limited resources such as high performance computers.

(viii) *proposals for an Industrial Partnership Development Fund*

16. There are already existing schemes to stimulate links and collaboration with industry. Some are operated by the Office of Science and Technology, whilst others are operated by individual Research Councils. NERC operates a scheme called CONNECT to allow individuals to apply for grants jointly with *new* industrial, or other user, partners.

17. NERC is concerned that bringing these together may impede individual Councils' ability to tailor schemes to suit the wide variety of users and beneficiaries. However, NERC identifies a gap in funding opportunity that allows scientists, engineers and technologists to develop demonstrators at a pre-market stage and that there could be benefit in bringing all schemes together via establishment of a development fund, to fill this particular need. This, however, should be achieved without additional bureaucracy or overhead.

OTHER ISSUES

(ix) *Transparency and Accountability of Research Councils*

18. The report criticises the Research Councils for their lack of transparency and accountability. NERC believes that this is the result of a misunderstanding. NERC's procedures are fully transparent and accountable and involve peer review committees and boards containing members of the academic and user communities.

19. The report also suggests that Research Council funding is short term and unpredictable. NERC considers this suggestion unjustified as there is support to universities through a variety of funding modes:

- infrastructure and core/strategic grants typically run over periods of 10 years or more;
- thematic programmes in identified priority areas (constituting about 20 per cent of NERC's budget) typically run for five years; and
- non-thematic (responsive) grants typically run for three years and are not driven by any priorities other than those of the academic community.

(x) *Research Council Institutes*

20. NERC rejects the suggestion that Research Councils favour their own Institues. The NERC Centres and Surveys are funded on the basis of open and transparent peer review. The award of continued funding is made through a five yearly review. The degree of scrutiny and peer review is similar in Centres and Surveys and universities.

20 October 1997

APPENDIX 10

Memorandum submitted by the Institution of Professionals, Managers and Specialists

INTRODUCTION

1. The Institution of Professionals, Managers and Specialists (IPMS) is a trade union which represents 80,000 scientific, engineering and technical staff in the Civil Service, research councils, other public bodies and an increasing number of private sector companies. Our membership ranges from laboratory assistants to chief executives and directors of PSREs and chief scientists in departments. IPMS' primary interest in the Dearing Report lies in the implications for research funding and support, as set out in chapter 11. Although most of our members are not directly involved in university research the method of funding is important both to research councils because of the dual funding aspects and, more broadly, because of the general distribution as well as the quantum of public funds for scientific research. IPMS also works closely, under the auspices of the Science Alliance, with the other main scientific unions: the Association of University Teachers (AUT), Manufacturing Science Finance (MSF) and the National Association of Teachers in Further and Higher Education (NATFHE). All the Science Alliance unions have a keen interest in the Dearing Report. We would welcome an opportunity to present oral evidence to the Committee, and should be glad to do so on a joint basis.

2. IPMS' evidence seeks to address, in brief form, the specific questions posed by the Committee. However, we consider it important that these responses need to be viewed in the context of the current funding problems for scientific R&D, which set the scene for our memorandum, and also factors affecting the supply of scientific labour. In considering technical and financial details, the position of scientific students and staff must not be neglected. Some key concerns are outlined in paragraphs 16-19.

SCIENCE FUNDING

3. The shortfall in funding for university research is long acknowledged and widely agreed. Evidence submitted by the Committee of Vice Chancellors and Principals to the Dearing inquiry showed an annual gap in funding for research infrastructure of £520 million. This follows on a cut of £170 million in capital funding for universities announced in the 1995 budget and acknowledgement by the DFEE last year that the Private Finance Initiative could not fill that gap. Sir Ron, himself, in evidence to the House of Lords Science and Technology Select Committee said " . . . while there has been a very good record of achievement, there is a much less satisfactory record of maintenance of the capability to conduct research in the future. To an extent my own judgement would be that we have achieved the very high level of performance by eating into capital that was created in the past, in terms of buildings, infrastructure and research equipment. As a result we now have a worrying position".

4. IPMS agrees that the indirect costs of research must be properly covered. Although the 1993 Science White Paper proposed that universities should work towards fully effective internal accounting systems, which would enable them to levy a full economic cost for research, neither the Government nor HEFCs have taken this forward. To do so will require additional funding. Yet, funding for university and research council research comes from the same SET base which is itself being pared back. Analysis of the 1997 SET Statistics published in July by the Office for National Statistics shows that planned expenditure by the Research Councils in the current financial year is 1.2 per cent lower in real terms than estimated outturn expenditure for 1996–97 (see Annex 1). Funding of the HEFCs will fall by 0.6 per cent and the Science Budget as a whole is cut by 0.9 per cent. The Government has not yet published expenditure plans beyond 1997–98 but has indicated that it will work within the public expenditure totals set by the previous Government. The Chief Scientific Adviser has warned that this will result in a real cut in the Science Budget. It clearly implies a worsening financial position for the Research Councils. It is against this background that the Dearing Report estimates that an additional £110 million per annum is required to meet the full costs of grants to universities by Research Councils.

INDEPENDENT ADVISORY COUNCIL ON NATIONAL RESEARCH POLICY

5. Dearing calls for an independent body of academics and industrialists to oversee the whole of research in Britain and advise the Government in private. This implies that the current bodies already charged under the Science White Paper with doing this—the Council of Science and Technology (CST) and Science and Engineering Base Co-ordinating Committee—are not doing their job properly. They are supposed to act as a bridge between the research council and university funding council elements of the science and engineering base. Both committees give advice in private. It is likely that any new advisory committee would cover the whole of the SET base (ie including the research councils) and IPMS would want its advice to be public and open to scrutiny.

RESEARCH ASSESSMENT EXERCISE

6. This is an issue with which other Science Alliance unions have more direct involvement. IPMS would generally support the objective of encouraging a plurality of research activities. The Dearing Report confirms the view that teaching and research are mutually supportive activities but we are struck by the concerns of colleagues that an increase in research selectivity could damage this relationship. There are also fears that the current research assessment exercise acts as a barrier to the development of new research groups and to the growth of interdisciplinary research.

RESEARCH EQUIPMENT LOAN SCHEME

7. The Dearing Report suggests a low interest loan fund to help upgrade laboratories and equipment to be repaid through overhead costs charged to research councils, industry and other sponsors of research. Initial indications are that major funders from industry and medical research charities are distinctly unenthusiastic about paying more in overheads. IPMS is not optimistic either about the level of participation in such a scheme or its ability to bridge the huge funding gap that now exists.

FUNDING FOR RESEARCH INFRASTRUCTURE

8. The increased provision for the overheads incurred in university research must not be diverted into paying for more research students, as a recent study by Coopers and Lybrand showed, but must be used to address infrastructural problems. In late September the DFEE announced an extra £165 million funding for universitites next year, about £25 million of which is intended for short-term infrastructure funding. It has not been decided how much of this will be directed on research facilities but it falls far short of the £200 million called for in the Dearing report for the immediate research equipment and capital needs in universities. The Science Minister has described the additional funding as " . . . a signal of our intention of where we are going to go . . . It is rather more than has been done in the past". IPMS would not disagree with this but the fact remains that increased investment is urgently needed. As the former Chair of the Committee of Vice Chancellors and Principals (CVCP) has argued "The CVCP is clear that the long-term vision set out by the Dearing Committee in its report . . . will not be achieved unless the funding gap is addressed with vigour. Institutions need assurance that the money saved from the abolition of maintenance grants and the introduction of student contributions to tuition will be reinvested in the infrastructure for teaching and learning". Further, as the Dearing Report recognises, it is unrealistic to expect that the Private Finance Initiative will support major research and teaching equipment and laboratory facilities which have little revenue earning capacity and are rapidly depreciating assets.

DUAL SUPPORT FUNDING SYSTEM

9. The "dual" elements of the system are the block grant of the Higher Education Funding Councils and the project grants of research councils, in which IPMS has substantial numbers of members. Funding of university research through this system includes provision for 45 per cent of staff costs for the support of project overheads. The Dearing Committee agreed with the widely held view that this level of support is inadequate. Dearing recommended that "Research Councils should meet full overhead costs on project grants, preferably through an additional £110 million to fund overheads at 60 per cent of associated staff costs".

10. The alternatives are either that fewer alpha rated research proposals will be grant funded and/or that higher overheads will be paid for through cuts in research councils' own research or administration. In reality few, if any, observers are optimistic that the Government will find new resources for research support although Dearing recommends that ". . . the first, and preferred method, is an increase in the quantum". The Science Minister has expressed the hope ". . . that a decrease in the volume of research (funded by the research councils) is not going to take place" but according to one research council official "It now seems likely that there will be full funding for project grants, but with no transfer of funds from the funding councils. The result of that will be a significant loss in the amount of research which is supported by the research councils".

11. As the Dearing report does not specify that other external research contracts must also be charged at full economic cost, it seems that this penalty will be incurred unfairly by the research councils. Indeed, the CBI has warned that ". . . any serious hike" in the cost of university research could result in a cut in the research links with industry. Philip Wright, head of science and technology policy at the CBI, agrees that universities should accurately assess the costs of their research but has warned that businesses are unlikely to increase their research contribution. This is extremely important because, as the Dearing Report shows, the research councils fund only 22 per cent of total research income whereas industry, charities and other private sources provide 25 per cent. Therefore changes to research council funding can provide only a partial solution.

12. Research Fortnight has produced the following estimate of the decline in project grants of higher overheads are imposed within existing research council budgets.

Increased overhead rate (per cent of project staff costs)	*Percentage cut in grants*	*Money for new projects*
45	0	£100m
60	7	£74m
80	14	£44m
100	21	£19m

Note: Staff costs assumed as 60 per cent of total project costs.

Source: Research Fortnight 17/9/97.

On this basis, money for new projects would almost certainly be wiped out for at least a year.

13. The outgoing Chief Executive of PPPARC has warned that ". . . the reduction in funding could mean that 250 of our brightest young physicists and mathematicians would be out of jobs . . . we would have to renege on grants already awarded to universities because we wouldn't be able to afford the increased overheads". John Krebs, Chief Executive of NERC, has commented that success rates for grants would plummet ". . . to a level that I would regard as undesirable and unacceptable in terms of the nugatory effect on morale in the community".

Interdisciplinary and Collaborative Research Projects

14. Strategic and applied research undertaken in collaboration with industry should be closely associated with the relevant underpinning science. Discoveries in basic research are the foundation for the generation of ideas and intellectual property from which industrial and commercial applications result. Examples include the digital technologies developed by the Defence Evaluation Research Agency and the application of technology developed by PPARC for screening for breast cancer. AEA Technology, until recently within government, has a wide range of research based commercial achievements including rechargeable batteries, robotics technology and software for rail and air traffic control programmes.

Industrial Partnership Development Fund

15. It is not clear from the Dearing Report how an Industrial Partnership Development Fund administered by DTI would be an improvement on the existing schemes in operation. Schemes such as CASE and LINK have distinct objectives but are sufficiently flexible to respond and adapt to the specific needs and activities of individual research councils. It is debatable whether a single DTI fund would retain the same degree of flexibility. It needs also to be remembered that existing schemes are broad in application, extending beyond the university sector. Therefore any change would need to cover a range of research providers.

Supply of Scientific Labour

16. Further consideration needs to be given to the operation of the student fee arrangements. The indications at present seem to be that science and engineering students will be penalised for choosing more expensive and longer courses. This will have a particularly detrimental effect on the supply of students to physics and engineering, for which four year courses are increasingly common. Indications are that the decision several years ago to freeze tuition fees to educational institutions has already had an impact on the quality of course provision, particularly in more expensive science areas. If, as has been suggested, an "Ivy League" of institutions able to charge top-up fees emerges, access will become even more unequal.

17. It is also unclear what will happen to postgraduate students who will not be in a position to pay back their loans. The DFEE has argued that loans will be repaid on the basis of higher salaries paid to graduates. However whilst this clearly holds true for some professions, such as law and accountancy, it is not necessarily the case for SET graduates. IPMS has among its members many scientists qualified to higher degree or doctoral level who earn less than £20,000 a year. Sir Gareth Roberts, former chairman of the CVCP has stated that *"There must be equity so that students are not deterred from entering longer or more expensive courses in science and technology, medicine and other professional courses".*

18. For scientists in post, the Dearing Report recognises the problems caused by making appointments on short term contracts, and notes that *"....the quality of research could be undermined if these researchers do not have a more secure career".* IPMS and other Science Alliance unions have repeatedly drawn attention to this issue and are pleased to note that the Government is monitoring the application of the concordat on contract careers, agreed by the research councils, Royal Society and CVCP, both within the university sector and more broadly among the staff of PRSEs. Another key issue is that of waiver clauses in short term contracts, common for both unfair dismissal and redundancy. There have been some indications that this issue may be addressed in the proposed "Fairness at Work" Bill. However, the AUT has already made significant progress on this issue. A campaign against the use of waiver clauses for contract research staff at Leeds University resulted in a decision by the University's Council in June to abolish all waiver clauses in fixed term contracts and a recognition that "...such waivers demotivate a growing and important section of the University's

employees". The University acknowledged that the cost of removing the unfair dismissal waiver would be nil if the proper procedures were followed. The cost of removing the redundancy waiver was estimated at just over £100,000, equivalent to just 0.125% of the academic and related £80 million pay bill.

19. We welcome the recognition in the Dearing Report that consideration need to be given to the training and development needs of staff, including on issues such as information technology and intellectual property rights. Consultations with our members has shown that training and development is a matter of increasing concern to scientific and technical staff at all levels. We will shortly be surveying our members in order to obtain more detailed information on the current position across the public and private sectors and with a view to developing a bargaining agenda based on the experiences and aspirations of members.

CONCLUSION

20. IPMS welcomes the publication of the Dearing Report on the basis that it addresses important issues for the future funding and organisation of public sector scientific research. We believe, however, that more detailed consideration needs to be given to the practical implications of some of the recommendations of the Dearing Committee. The political and popular focus on the issue of tuition fees must not be allowed to obscure the important debate that needs to take place on the research aspects of Dearing's proposals and the urgent need to renew a decaying research infrastructure.

23 October 1997

APPENDIX 11

Memorandum submitted by the Economic and Social Research Council

1. INTRODUCTION

1.1 ESRC is the UK's leading funder of project based university research in economics, education, management, sociology and other social science disciplines. It is a key funder of postgraduate training in these areas and has a partial responsibility for support of research infrastructure. Individual copies of the ESRC's response to Government on the Dearing Report are attached for Members' interest. References to the response follow each of the main points set out below.

1.2 If the Committee would like me to provide oral evidence in addition to this memorandum, I would be very pleased to do so.

2. MAIN POINTS

2.1 Proposals for an Independent Advisory Council on national research policy need to be considered carefully. Attention to definitions and the relationship to established bodies in the area need particular attention, or they may undermine the present arrangements for accountability in the public funding of research. (Attached response, Section 27)

2.2 The Research Assessment Exercise, RAE, should be reviewed not only for its effects on the increasingly important area of inter-disciplinary research but also because of the perceived tensions between the requirement of the Exercise and the Research Councils' emphasis on meeting the needs of a wide range of users of research. (Section 12)

2.3 Proposals for a research equipment loan scheme should include provision for social science research infrastructure such as datasets, archives and specialist collections. (Section 15)

2.4 The future funding system for research in universities should continue to allow the Research Councils to support high quality research, wherever it is found. In principle, full funding of research by Research Councils outside of academic staff salaries would be welcome. However, a number of factors should be taken into account before this principle is introduced: the tensions referred to at 2.2 above; the serious short and medium term problems of a reduced volume of research, if Research Councils have no additional funds for higher indirect costs; and the incentive effects of supporting higher levels of indirect costs. (Section 14)

2.5 ESRC's experience is that there are indeed difficulties with regard to interdisciplinary (see 2.2 above) and collaborative research projects. On the latter point, sharing of research facilities in the social sciences is rather different from the laboratory equipment needs of the natural sciences. Social scientists require access to high quality national—and increasingly, international—libraries, data and other resources. (Section 10)

2.6 Proposals for an Industrial Partnership Development Fund could mean one of two things. Firstly, a more user-friendly framework for collaboration between universities and industry—moves in this direction would be supported by the ESRC. Alternatively, it could mean a re-drawing of Research Council responsibilities away from some of the very areas—such as LINK, the Teaching Company Scheme and Collaborative Studentships—where the ESRC has been developing provision to address its mission to engage with users of research and training. ESRC wishes to develop further its existing responsibilities in these areas. (Section 19)

3. In Addition, the ESRC Would Like to Draw Members' Attention to Three Other Points

3.1 Much public debate on undergraduate fees and grants has entirely ignored the potential impact on postgraduate training. The ESRC's standard grant for postgraduate students is £5,295 per annum. It is likely to be very difficult to continue to attract sufficient numbers of applicants of the right quality for ESRC studentships if the applicants have debts of over twice their ESRC annual grant as a result of undergraduate study. Furthermore, if there is to be a redirection of funding to follow the student, reduced demand leads to reduced provision. These possible consequences of the introduction of increased loans would be a significant threat to the long-term health of the social science base. (Section 9)

3.2 The ESRC supports introduction of a mission-oriented, independent, Arts and Humanities Research Council, providing that ESRC's own ability to address its mission is unimpaired. (Section 17)

3.3 The Dearing Report is incorrect in its assertion that "Funding body research funding provides the only way of funding the unconventional or unfashionable field, or the unknown researcher". In common with sister Councils, the ESRC operates a vigorous responsive mode scheme for just this kind of research, with, in ESRC's case, special provision for new researchers within the responsive scheme. (Section 11 and Paragraph 11.25 of the Report)

21 October 1997

APPENDIX 12

Memorandum submitted by the Particle Physics and Astronomy Research Council

Introduction

1. PPARC is the primary organisation responsible for UK research in particle physics, astronomy and space science. Most of this research is carried out in the university sector, with 75 per cent of PPARC funding going (in 1996–97) to the 13 Physics Departments awarded grades 5/5* in the 1996 RAE. Other PPARC grant support is spread over 25 (generally smaller) Physics Departments, most frequently funding research in astronomy, which significantly enhances local undergraduate recruitment and teaching programmes. It is acknowledged that PPARC research also involves much of the leading edge pure mathematics research in the UK. The PPARC academic community comprises 650 research active academic staff (as classified in the 1996 RAE), together with 840 post doctoral researchers, 87 research fellows and 450 research students.

2. UK research in particle physics, astronomy and space science has so far survived a period in which the respective share of the Science Vote has halved since 1974–75 and the domestic (ie less CERN and ESA subscriptions) research funding has fallen by 17 per cent (in real terms) since 1984–85. This has been achieved, while maintaining reputation and impact, by concentrating almost wholly on internationally collaborative research. The major partners traditionally are—and continue to be—the USA, Europe and Japan. In all these countries, research funding has been maintained at a higher level than in the UK, particularly in relation to national programmes and infrastructure. Against this background PPARC welcomes the Dearing Report and the overdue focus it has brought on the changing structure and funding of university research needed to maintain the UK's global impact. Our comments take the form of two general and several specific responses to Dearing.

People

3. An acknowledged strength of PPARC research is in the attraction and retention of first-rate students, especially in Physics and Mathematics. Essential to both the attraction and the quality of education and training received by those young scientists is the visible involvement of UK reserach teams in world-leading research programmes, such as those of CERN, ESA and in exploiting our overseas telescopes and radars.

4. The community of research students, research fellows and contract researchers (post-docs) make a major contribution to university research, and that is likely to become still more important with the growing demands on academic staff time arising from increasing undergraduate numbers. At the same time, the output of young scientists exposed to challenging research programmes, often international, represents the resource most valued by both universities and industry. (In this regard it is important to note that the human product of academic research is more easily retained for the benefit of the UK than is new knowledge per se).

Infrastructure

5. Second-rate research is of little value. Similarly, training deprived of access to front-line programmes or to the best equipment is greatly devalued. In the PPARC area, the necessary quality of projects is generally assured by undertaking research largely within major international collaborations. However, both the quality of UK researchers and the competitive position of UK research teams (in gaining lead roles in CERN experiments, in ESA satellite payload selection, or in winning time on overseas telescopes) depend critically on the laboratory equipment, computing facilities and technical back-up in their home university departments.

VOLUME OF RESEARCH

6. The substantial recent growth in the numbers of contract researchers over the past decade has led some to suggest that the solution to the under-investment in infrastructure (documented in the Dearing Report) is to reduce the volume of research carried out in universities. PPARC would argue against that "solution", since:

(a) it would directly reduce the return from our investment in CERN and ESA programmes, where the subscriptions are fixed by relative GDP, but exploitation depends on the involvement of individuals and research teams; and

(b) it would also reduce the flow of scientists, mathematicians (plus engineers and research managers), training in those and similar programmes, 50-60 per cent of whom eventually move into careers outside academic research. (We note the current skills shortage is leading to companies such as British Aerospace having to recruit abroad).

We would finally draw attention to the anomaly of a reduction in research (and training) opportunities alongside a significant increase in undergraduate numbers.

COMMENTS ON SPECIFIC DEARING RECOMMENDATIONS

7. *Advisory Council on national research policy*

PPARC has little knowledge of the workings of the CST whose deliberations are not published. The SEBCC has, on the other hand, developed into a valuable forum for debate, particularly in bringing together the FCs and RCs, the two major funding bodies of university research (though within different Departments in Whitehall). A new body to replace the CST, with a strong link to the research community, and which published its recommendations might have greater impact and community confidence.

8. *Research Assessment Exercise*

This has been beneficial in focusing university research and improving overall quality. It remains a valuable complement to RC peer review.

9. *Computer networks, etc*

The continuing development of SuperJANET, and improved access to and lower cost of international data links should remain priorities, given the growth of complex, multi-discipline and international research programmes. PPARC believes these facilities should preferably be funded nationally, and remain free at access to university researchers. This would limit bureaucracy and retain usage by need rather than ability to pay.

10. *Research loan scheme*

Given the current state of university research infrastructure, access to a "cheap loan" scheme would provide the surest route to a rapid re-building of the "well-found laboratories" on which much of the current academic research strength was built. There seems no alternative to these funds being made available by Government if they are to properly cover a wide spectrum of basic research infrastructure.

11. *Funding of research infrastructure*

In the longer term university research should be "fully funded". This may require an initial increase of the overhead on grant awards, to, say, 60 per cent of staff costs (as recommended by Dearing). However, it is important to note that this change will require additional funds to be made available unless a corresponding reduction is made in the volume of university research (see para 6).

In PPARC's case, any volume change would have to be introduced over four to five years, if serious disruption to our existing commitments was to be avoided.

In parallel with any adjustment, the universities should seek to develop a clearer, more transparent estimate of both fixed and volume-related costs.

Differential overhead levels would be difficult for RCs to manage, but would encourage universities to be efficient.

12. *Dual support*

PPARC supports the continuation of the principle of dual support, which has served university research well over many years.

23 October 1997

APPENDIX 13

Memorandum submitted by the Council for Industry and Higher Education

INTRODUCTION

1. The Council for Industry and Higher Education aims to encourage industry, further and higher education to work together and to represent joint thinking to Government and other major influencers. It is funded by company donations and its Council is composed of the chairmen or people of similar standing from a broad cross section of companies together with a range of vice-chancellors and heads of colleges. The Chairmen of the Funding Council and Quality Agency also attend.

REVOLVING INFRASTRUCTURE LOAN FUND

2. The Dearing Committee proposed a revolving infrastructure loan fund to support research infrastructure. Industry is generally unwilling to contribute to this. This paper explains why and argues that universities must adopt transparent full cost accounting systems to cover their overheads. It suggests that bilateral partnerships between companies and university centres of excellence might need to be further developed.

BACKGROUND

3. The National Committee of Inquiry into Higher Education (Dearing) proposed in their report that the Government should promote and enable *"as soon as possible, the establishment of a revolving loan fund of £400–£500 million, financed jointly by public and private research sponsors, to support infrastructure in a limited number of top quality research departments which can demonstrate a real need"* (Recommendation 34).

4. The proposal stemmed from the revelation in various other reports that the research, laboratory and other key infrastructure within universities had not received the investment they need to ensure they are of a world class standard. Hence, both research work and relevant experience on modern equipment for students were being impaired. This view was reinforced by visits to certain institutions from members of the Committee.

THE FUNDAMENTAL CAUSES

5. The main reason for this deficit, as the Committee recognised, is the universities have not been covering the full cost of overheads in their project pricing policies. In their desire to increase the volume of research undertaken and hence their relative standing in the all important Research Assessment Exercise, they have been failing to invest in infrastructure and almost certainly cross-subsidising research from teaching and learning budgets.

6. CIHE therefore considers that the prime objective is to ensure that:

- full cost accounting systems are in place in all institutions;
- there is a full recovery of overheads from projects undertaken from the Research Councils, Charities, the EU and the Private Sector;
- if need be the volume of research is reduced in line with what can be fully resourced and with there being a smaller number of centres of excellence in each relevant field; other institutions or researchers might have access to such centres; and
- there is a shift in funding methodologies to support diversity and in particular teaching and learning rather than the current focus on rewarding and hence encouraging research.

Following rationalisation, it should be practical for centres of excellence to borrow to reinvest against future earnings.

TRANSITIONAL NEEDS

7. There could still remain however, a backlog of under-investment. This transitional issue needs to be addressed and a loan fund that can be accessed by international centres of excellence would be one way forward.

8. The largest single element of funding must come from public sources, both directly from the Government and from the Funding Councils. There are the following objections to private industry providing significant sums:

- it is not their role to provide basic infrastructure rather than project funding;
- it is the state's role to provide such infrastructure including out of taxes which companies pay;
- to expect UK industry to provide additional funding would place them at a competitive disadvantage to overseas competitors and would further encourage the drift of project funding to overseas institutions; many companies perform research globally and make appropriate competitive choices;
- industry might have little control over a revolving loan fund and would find it difficult to justify to shareholders what benefit such loans might bring to their companies; and
- companies often have close relationships with centres of expertise; available resources are better focused on developing such relationships.

Possible Options

9. If companies are generally unwilling to take on additional liabilities, it might still be possible for industry and universities together to establish a central Fund as a charitable trust with independent trustees including strong industry representation focused on specific disciplines. The fund might make loans to specific universities that have international centres of excellence in designated subject areas raising its money primarily from the Government and the Funding Councils but with an element from companies (which would have a contingent liability for that borrowing) and research charities. The companies and charities might subsidise the Fund by making grants, so attractive rates of interest could be provided to the universities. The loans and grants would be time limited. The loans would be off the balance sheets of the universities and hence outside the PSBR.

10. However there has been little enthusiasm for even this more limited variant of the revolving loan fund proposal.

11. What is probably achievable is that specific companies or consortia might be willing to sponsor specific subjects in selected centres of excellence, including the funding of state-of-the-art equipment. This would build on and encourage close relationships where both partners see mutual interest. This is the model for the centre for Applied Catalysis.

22 October 1997

APPENDIX 14

Letter to the Clerk of the Committee from the Museums & Galleries Commission

The Museums & Galleries Commission (MGC) is pleased to have the opportunity to submit evidence to the Science and Technology Committee's inquiry into the implications of the Dearing Report for the Structure and Funding of University Research. The MGC is the Government's chief advisory body on museums throughout the United Kingdom. We work closely not only with the Department for Culture Media and Sport but also other central Government departments and relevant agencies, including the Higher Education Funding Councils.

The point we would wish to make to the Committee is a simple one. We were extremely disappointed that in the one reference in its main Report (12.30) to university museums and collections, the Dearing Committee concentrated exclusively on these collections as public amenities provided by universities. This emphasis give a false impression, as well as a dangerous one at a time when universities are increasingly forced to scrutinise and justify every element of their expenditure.

In its original submission to the Dearing Review, a copy of which I attach, the MGC sought to draw attention to the very important role that university museum collections can and do play in research, both in the humanities and the sciences. This contribution was underlined in the important review of Earth Sciences carried out by the University Funding Council in the late 1980s, which led to the establishment of five UK Earth Sciences Centres to act as repositories for geological collections and centres of research. We also cite in our submission to Dearing the example of the Manchester Mummy Project, in which research into specimens held in the Museum's collections has led to important results concerning our knowledge of human diseases and physiology.

There are many more examples of university collections making an important contribution to their institutions' central purposes. In the view of the MGC, even more use could be made by many universities of the collections which they hold in trust, both as part of the institution's own teaching and research programmes, and by outside researchers.

University museums are keen to play a full role in the life of their institutions. They recognise the need for them to justify the funding they receive. However, these objectives are made more difficult when such a major policy review as the Dearing Report apparently fails to understand that university museums exist not only to serve the wider public but also to contribute directly to teaching and to research.

22 October 1997

APPENDIX 15

Memorandum submitted by the University of York

INTRODUCTION

1. As one of the UK's major research-led universities, the Dearing Report and its implementation are of major concern to the University of York. York is now one of the country's leading research universities in terms of both quality and volume of activity, despite being only 34 years old.

- York has always been in the top ten rated British universities for research. According to the most recent RAE (1996), 19 out of the 23 subjects assessed at York achieved top scores of 4, 5 and 5*.
- York's income from research contracts, at £18.6 million in 1995–96, is the 14th largest of any university in the country.
- The University offers major research expertise in Health and in Bioscience (life sciences), although its research portfolio spans the full range of disciplines.
- Through research, the University has developed very close working relationships with industry, charitable bodies and government. The University hosts the NHS Centre for Reviews and Dissemination and was a founder partner in the Bioscience York initiative, a consortium involving the University, local government and commercial organisations such as Nestlé, Covance and Smith & Nephew, designed to make York one of the world's leading centres for biotechnology and research in the life sciences.

COMMITTEE'S INQUIRY—SUMMARY

2. It is from this position of research leadership that the University addresses the Committee's inquiry. It does so with a concern that the views of research-led universities, such as York, are increasingly submerged in a political agenda for higher education which is dominated by the very valid concerns of access and widening opportunities. There is a danger that such issues impact indirectly, through a rechannelling of public funds, on the ability of universities to fulfil their research mission.

3. Overall, the University of York believes that Dearing's discussion of, and proposals on, research are helpful. They point towards a future in which research-led universities are better funded and the number of such universities is, in effect, limited. Although Dearing points towards greater sharing and collaboration on international, national and regional levels, it is not yet clear how these desirable objectives are to be attained.

4. With regard to the Committee's inquiry, the University of York believes that:

- A Research Assessment Exercise is needed every five years instead of every four.
- Appropriate research overheads are essential.
- The dual support system for research funds should be kept.
- An independent advisory council for research is not needed.
- The maintenance of excellence in research requires additional funding.

THE RESEARCH ASSESSMENT EXERCISE

5. The University believes that the Committee must address a key question: Is the level of accountability in the Research Assessment Exercise too high?

6. The University of York acknowledges that accountability of research spending is essential and accepts that some form of RAE is desirable and inevitable. The Exercise fulfils a valuable role in demonstrating accountability of the sector for the funds channelled through the HEFCE for research (one of the two arms of the dual support system) and for providing proper incentives for improved performance.

7. The RAE cannot be increased in frequency, not least because the pressure on the system is so great—each RAE generates a vast amount of work for individual researchers and administrators in each institution. In the distant past, quinquennial acountability was deemed adequate, and the touch was much lighter.

8. The University of York recommends that the Committee consider the case for reducing the frequency of RAE and for simplifying each round to provide an acceptable level of accountability that at the same time reduces the pressure on the system. A five year gap between exercises would be more acceptable, increase the time available for research, allow for flexibility in the system, and reduce the administrative burden.

OVERHEADS FOR RESEARCH

9. There is a clear view expressed in the Dearing Report that appropriate overheads should be provided on research grants and contracts awarded through the research councils and through government, to enable universities to provide the necessary support for high quality research projects, and that the current levels (45 per cent) are inadequate for this purpose. The University of York thoroughly endorses this observation, but not if the additional resources are provided by transferring money from one element of the "dual support system", the Higher Education Funding Council (HEFCE) to another, the research councils—the issue which has come to be referred to as the QR transfer.

10. The arguments against such transfer are essentially those in favour of the dual support system, which we believe has been the secret of the success of UK university research, and the fact that the previous transfer was a financial disaster.

11. The University of York therefore recommends to the Committee that appropriate research overheads are essential for infrastructure if research in UK universities is to retain its quality and competitiveness.

DUAL SUPPORT SYSTEM

12. The arguments in favour of dual support are numerous, but fundamental to them is the distinction between institutional and disciplinary support (QR funds from the HEFCE) as opposed to topic and contract support (funds from research councils), and between bottom-up (individuals in universities) versus top-down (research councils) research initiatives.

13. The HEFCE's allocations for research (QR) are provided to enable universities to provide institutional facilities and cultivate an environment in which high quality research can flourish. It is through QR that core academic staff are funded, and through which universities are required to provide core laboratory facilities. It also enables universities to develop their own initiatives in respect of identifying research priorities rather than merely responding to top-down policy initiatives from the research councils. It is often from these bottom-up developments that research councils are able to develop new research themes that are then taken further through top-down policies.

14. In addition, the ability of universities to provide an adequate core infrastructure has been hampered by successive efficiency gains over a sustained period—any further transfer will impact adversely on universities' abilities to compete effectively for funding with research councils, government or industry.

15. The University of York is of the opinion that high quality university research flourishes under the dual support system. Further reforms to the system will only hamper the ability of universities to compete effectively for funding. The University of York therefore urges the Committee to retain the system for research funds.

INDEPENDENT ADVISORY COUNCIL

16. The University of York does not see the need for an additional independent advisory council in national research policy. The University would prefer to see existing mechanisms for collaboration and co-ordination (for example, between the HEFCE and research councils) better developed.

17. The University recommends that the Committee recognise the added bureaucracy and confusion in the system that might follow from the establishment of a further body involved in national research policy.

ADDITIONAL FUNDING

18. The issues of access to IT systems by researchers, the funding of equipment, the funding of research infrastructure, and the proposals for an Industrial Partnership Development Fund have one thing in common: a need for additional funding—beyond that which is essential to overcome the short-term funding crisis.

19. The University recommends that, when considering funding, the Committee recognises that there are problems which are specific to a small group of research-led universities with high performance indicators and large volumes of research. The University urges the Committee to take into account the needs of research-led universities when making recommendations for the funding of the university sector.

October 1997

APPENDIX 16

Memorandum submitted by ICI

INTRODUCTION

ICI is a British multinational chemical company, with sales of approximately £10bn, and headquarters in London. It is currently in the process of restructuring, through the divestment of some cyclical commodity businesses, following the acquisition of Unilever's Speciality Chemicals Business. In its new form, ICI will be mainly focussed on the highly competitive global markets in Coatings, Food additives, Personal Care, Resins, Adhesives and Materials. It is a technology-driven company, and spends in excess of 3 per cent of its sales revenue on R&D. Over a third of this R&D is carried out in the UK, where it is underpinned by the UK academic base. ICI spends over £5m per annum on academic collaborations and recruits on average about 100 graduates and post-graduates per year from UK universities. We believe that a strong R&D presence in the UK, with its good quality science base, is a global competitive strength. We therefore look to academia as a source of highly trained recruits and leading edge research.

SUMMARY

- We support the idea of an Independent Advisory Council on National Research Policy, which should have industrial contributors.
- We support the RAE mechanism, but believe it should be modified to stress a range of desirable outcomes.
- We believe the Government should urgently address the issue of academic infrastructure under-funding, but do not believe the Research Equipment Loan Scheme is a realistic approach.
- We believe that multidisciplinary and collaborative research is very important, and would like to see incentive mechanisms to promote this.
- We do not support the IPDF as an appropriate process, and would prefer to see consortia activity promoted by schemes like "Foresight Challenge".

COMMENTS ON THE POINTS RAISED IN THE ENQUIRY

Proposals for an Independent Advisory Council on National Research Policy

1. A similar body was proposed in the 1993 White Paper on SET, but, we believe, it was never set up. Our company strongly believes in supporting national initiatives of this type and consequently supported the National Foresight Exercise both with panel chairmen and with representatives and secondees to OST.

2. We welcome the current proposals for an Independent Advisory Council, which we believe should include senior industrial representatives.

Alterations to the Research Assessment Exercise and the Balance between Teaching and Research

3. We believe that the principles behind the RAE, which directs the funding available towards high quality research departments, are sound. However the practice had led to a number of unsatisfactory outcomes. The RAE discourages activity to deliver high quality teaching, and does not adequately recognise multidisciplinary research and industrial support.

4. We continue to support the RAE as an appropriate mechanism to concentrate funding on departments with national and international status, but suggest it should be modified to take account of the concerns raised—all of which, we believe, are very important to underpinning future competitiveness.

The availability of and access to publicly funded IT systems by researchers and others

5. No special comment.

Proposals for a research equipment loan scheme—Funding for Research Infrastructure

6. That university infrastructure and research equipment in the sciences is in a poor state is beyond doubt. This problem requires urgent attention, as it is undermining the quality of academic teaching and research. Government spending in this area should be increased. If it cannot be increased then more funding should be provided for fewer projects, to maintain a high quality of output.

7. The suggestion that industry should contribute to a revolving loan fund does not appear very realistic. Large companies in our sector compete on a global basis, and cannot afford additional support on top of

their already considerable contribution, whilst our competitors enjoy appropriate Government support in their countries. Continuing difficulty in the UK can only drive companies to look elsewhere in the world for talent and research capability.

The future of the dual support funding system and the roles of the Research Councils and Higher Education Funding Council

8. In general we support the current system which recognises the distinct, but interlinked roles of teaching and research. We believe, however, that these areas are currently under-funded.

Funding for Interdisciplinary and Collaborative Research Projects and the sharing of research facilities; and proposals for an Industrial Partnership Development Fund

9. Through our participation in the National Foresight exercise we have continually promoted mutidisciplinary and collaborative research, which we believe to be essential to our industry. The key future areas of increased activity are likely to be the chemistry/materials interface, and the chemistry/biology interface. In addition, chemical engineering will need close links with both areas. Some changes are taking place in academia, but they are painfully slow (the RAE, as noted earlier, does not particularly help). We believe that consideration should be given to incentives for interdisciplinary working.

10. We are enthusiastic supporters of collaborative consortia between industry and academia, which provide a very efficient method of leveraging applied research, and would like to see more. Our company was a key player in the recent establishment of the Institute of Applied Catalysis, which is to receive matching funds via the Foresight Challenge exercise. However, we do not believe an institutional approach such as the proposed IPDF is the way forward. We recommend Government encouragement for the formation of consortia, through matching fund schemes similar to Foresight Challenge. This will ensure a high level of participant motivation to achieve success.

16 October 1997

APPENDIX 17

Memorandum submitted by The Institution of Chemical Engineers

1. INTRODUCTION

1.1 Based in Rugby, UK, the Institution of Chemical Engineers (IChemE) is the premier international Learned Society and qualifying body for chemical and process engineers. Founded 75 years ago and incorporated by Royal Charter in 1957, IChemE provides membership and technical services to individual engineers, the industries to which they relate, universities, government agencies and other bodies. Its 23,000 members (of whom 75 per cent are resident in the UK) are active in a wide range of some of the most successful and strategically important industries in the British economy, ranging from chemicals, through the energy sectors (notably oil, gas and nuclear), pharmaceuticals, food and drink, process engineering contracting and minerals processing. These industries are global in character and many share the characteristic of being research led, funding all their own research. They have strong links with higher education, depending on high quality graduates for their key staff. Many research links and partnerships with the universities have been developed. Chemical engineers are engaged in education, in research and development, in the design, construction and operation of processing plants and in the management of companies engaged in such activities. Chemical engineering is a particularly important technology in relation to both safety and environmental protection. The profession makes a strong contribution to a sustainable input to the nation's economy and relates to products and services which ensure quality of life.

1.2 The IChemE contributes to the maintenance of high standards in education by accrediting undergraduate degree courses, not just in the UK where chemical engineering is taught and researched in some 25 universities (predominantly those established prior to 1992) but also undertakes an equal number of accreditations overseas, notably in France, the Netherlands, Hungary, Singapore and Hong Kong, Australia, New Zealand, South Africa and the West Indies. The need for vigorous responses to global competition combined with increasing concern over environmental issues raise exciting and important research opportunities for chemical engineering. Advances in enabling sciences and technologies are facilitating radical new approaches to these critical issues. One of the main aims of the Institution is, therefore, to promote the advancement of the discipline and priorities have been identified in the recently published Strategy for Chemical Engineering Research for the UK (Appendix I).

1.3 The chemical and process industries are global in character and such companies, including those with headquarters in the United Kingdom, have the ability to recruit internationally and similarly deploy their external research spend by commissioning work in universities throughout the world. To be successful, the best companies need access to the best research irrespective of location. The UK academic tradition in chemical engineering is strong with a number of world class departments. Many notable developments in chemical engineering have been pioneered in the UK. This tradition and strength is well recognised internationally.

2. Proposals for an Independent Advisory Council on National Research Strategy

2.1 We support the need for independent assessment of overall research strategy. This should be done by a body independent of the present Research Council structures. It should be concerned with a long timescale forward look and it is essential that its procedures should be open and transparent to the research community. Present Research Council structures have led to a number of difficulties—notably between BBSRC and EPSRC at the boundaries of their areas of responsibility. This is particularly noticeable in relation to engineering topics at interfaces such as food, pharmaceuticals and in relation to biotechnology projects notably biochemical engineering.

3. Alternatives to the Research Assessment Exercise and Balance Between Teaching and Research

3.1 We are of the view that the RAE in broadly its present form has gained acceptance in the chemical engineering community. The recent emphasis on quality rather than quantity is correct, as is the concentration of research funds in more highly rated departments. The methodology however fails fully to recognise the increasingly multidisciplinary nature of much research in engineering and science and lacks consistency between different units of assessment and from one exercise to the next. There has been criticism that the absolute ratings given to chemical engineering in the last round of assessment were harshly graded damaging the external perception of the health of the discipline (see Appendix II).

The TQA process has not gained similar acceptance, there has been real concern about the quality of some panel members and lack of consistency between different assessments. The degree of competition that the process has produced between departments has been detrimental and has not encouraged the collaboration that is necessary for the development of both teaching and research within disciplines. It is interesting to note that there is a general correlation between TQA and RAE exercises, with a significant number of individual departments scoring well in both exercises. Detailed criticism of the TQA process has been prepared by the Standing Conference of Chemical Engineering Professors and is included as Appendix III.

We are concerned that the number and range of external assessment processes to which university departments are now subject detracts from their prime responsibilites of teaching and research. We strongly support proposals for a less intrusive quality assurance process. More formal links with professional institution accreditation processes could be usefully established as part of a simplification exercise. We support the suggestion that RAE Panels should include some overseas representation, bearing in mind established global perspective in chemical engineering research topics.

4. The Availability of, and Access to, Publicly Funding IT by Researchers and Others

4.1 In view of the rapid growth and importance of IT and its consequences for global communications, it is important that all researchers in the UK have access to the most advanced technology in this area. The success of virtual research schools will depend on IT links and we encourage the central provision of services, such as databases.

5. Proposal for Research Equipment Loan Scheme

5.1 While we recognise the urgent need for improvement of the infrastructure, and note that there has been some success with research equipment loan pools in EPSRC, the scheme has not made a significant impact and is unlikely to be able to address the lack of investment over successive years. Also, for many projects equipment is required over a long time period which limits the usefulness of such a scheme. We favour an extension of the Joint Research Equipment Initiative or preferably the provision of funds through the Industrial Partnership Development Fund. Virtual Research Schools and concentration of expensive equipment at specific centres to be used by members of such research networks seems a better option. The Institute of Applied Catalysis being established out of the Foresight Challenge provides a model.

6. Funding for Research Infrastructure

6.1 We share the concerns expressed from many sources that the quality of the research infrastructure in the UK has been allowed to decline. It is clearly nonsense to suppose that work can be carried out without a contribution to the infrastructure which makes it possible and we welcome the recommendations that Research Council grants should include a more realistic value for the overhead. This however would require either extra funding for the Research Councils or reduction in the overall number of grants. We would not support the transfer of funds from the Funding Councils to the Research Councils for this purpose. We support the view that physical resources should be made available for use by a variety of institutions and industries and indeed the range of bodies proposing to use such equipment should be a major criterion for justifying the investment. There is also an urgent need to invest in new equipment and techniques specifically applicable to the emerging technologies, for example biochemical sensors.

7. The Value of the Dual Support Funding System and the Roles of the Research Councils and Higher Education Funding Councils

7.1 We have observed above, that it is of vital importance that the infrastructure for research be improved and we agree that the allocations from the funding bodies have a key role to play in this. We also recognise that practising researchers are probably the best judges of priorities within the fields for which they are responsible but recognise that the Research Council grant system leads to short term funding—typically over a three year period. As long as this is balanced with the longer term support from the funding bodies, continuity can be ensured and provide a sound research platform from which to support innovative development.

7.2 We appreciate that it is not feasible for the UK to be pre-eminent in all research fields but feel that the Foresight recommendations identify the relevant priorities. We also recognise the important role of funding body research in supporting the new researcher who has not yet had sufficient experience or reputation to compete effectively for Research Council funding. Strengthening of the infrastructure requires not only buildings and equipment, but also people (see also Further Remarks below).

8. Funding for Inter Disciplinary and Co-operative Research Projects and the Sharing of Research Facilities

8.1 In recent years, chemical engineering has advanced rapidly in both breadth and depth, crossing the boundaries of many traditional technologies. It is, therefore, important that interdisciplinary and co-operative research is encouraged and indeed this was one of the key recommendations of our Strategy for Chemical Engineering Research. There is a particular problem for chemical engineering in that we have relatively small well distributed research groups and it has been argued that the recent RAE showed that, in respect of the Chemical Engineering and a number of other Units of Assessment, there was a need to achieve a critical size to achieve the very highest ratings. This points up the difficulty for small groups to cover demands of the undergraduate curriculum and also to be active in research. There is, however, no general impediment on smaller focused research groups achieving excellent ratings, as demonstrated in other Units of Assessment, such as Materials. Our proposal that virtual research schools be established, thereby contributing towards the achievement of critical mass, will encourage co-operation between disciplines and the effective use of research facilities, even to the extent of carrying out experiments remotely, and should be catered for in any revised RAE methodology.

9. Proposal for an Industrial Partnership Development Fund

9.1 We have stated in our Research Strategy Document that industrial support for chemical engineering research in Universities is important as it provides pointers for strategic priorities and provides a useful steer for work programmes. It could be that establishment of an Industrial Partnership Development Fund would improve support and lead more readily to implementation of research results in industry. This could be particularly important to SMEs provided that the schemes recognised that SMEs operate on short time scales, although it should be noted the nature of SMEs within process engineering tend to be different to manufacturing generally. They focus not so much on small units of production but rather on often highly specialist service companies which provide support previously found in larger organisations. We agree that such a Fund (which should be readily accessible and simple to administer) should replace the current plethora of funded initiatives currently available and should be enhanced to provide funds on substantially greater scale. However, what are missing are substantive incentives for industry to invest—such as long term tax benefits and tax free allowances for participating industries. We also feel that this Fund could usefully incorporate capital investment proposals for the infrastructure.

10. Further Remarks

10.1 The EPSRC/DTI sponsored report on process industry manpower ("The Supply, Education and Training of Process Engineers in the UK") forecasts an increasing demand for chemical engineers. This is reinforced by evidence of actual shortage in the 1996 Chemical Industries Association graduate recruitment survey. The demand from industry for chemical engineering graduates is so great that 27 per cent of companies have reported difficulties in recruiting adequate numbers of chemical engineers. Also, there are currently only 250 home students undertaking postgraduate studies in process engineering throughout the UK. It is likely that post-Dearing chemical engineering will have a crisis in manpower in relation to research students. The burden of accrued debt resulting from tuition and maintenance costs, in particular of those who have studied a four-year MEng (increasingly the norm for top flight students), is likely to be a disincentive for staying on especially when employers are hungry to recruit the undergraduate product. In turn, it is likely that, with University salary scales markedly out of line with industrial salaries (the latest Engineering Council report, October 1997, shows that the average and mean salaries for chartered chemical engineers are £45,593 and £40,265 respectively, well up into the professorial band: in contrast the Career/Senior Lecturer grade ends at £33,200), the next generations of researchers will not become available to the discipline as university teachers. New reward structures or the writing off of accrued debt for successful PhD students within a target time period would be a powerful incentive. Other options include top-up grants for postgraduates or guarantees of enhanced salaries from future employers as a result of successful partnerships with industry.

It is not in the longer term interest of UK industry that PhD research in UK universities should solely depend on overseas post-graduate students. The very success of chemical engineering graduates in industry is leading to a substantial difficulty in the recruitment of university personnel.

24 October 1997

Annex

The 1996 Research Assessment Exercise

ISSUES RELATING TO CHEMICAL ENGINEERING

There is concern in the community that Chemical Engineering Department ratings are lower than those of other engineering disciplines.

One way of looking at this is to compare the percentages of departments in a given discipline which have attracted the higher ratings (4 & 5). The data listed in Table 1 show that the percentage of chemical engineering departments achieving ratings of 4 or better in 1996 is lower than any of the other engineering disciplines. The difference is particularly marked when considering only the "old" universities where only 44 per cent of chemical engineering departments achieved the higher ratings compared with around 70 per cent for the other engineering disciplines. It is noteworthy that the percentages of chemical engineering departments are almost identical in the 1996 and 1992 exercises, whereas all the other engineering disciplines show large increases from 1992 to 1996.

TABLE 1 PERCENTAGES OF DEPARTMENTS SCORING 4 OR 5

Unit of Assessment	*All Universities*		*"Old" Universites*	
	1992	*1996*	*1992*	*1996*
Chemical Engineering	38	38	45	44
General Engineering	33	38	52	62
Civil Engineering	42	51	63	76
Electrical & Electronic Engineering	30	42	50	73
Mechanical, Aeronautical & Manufacturing Eng	33	40	56	70
Metallurgy & Materials	39	50	58	100

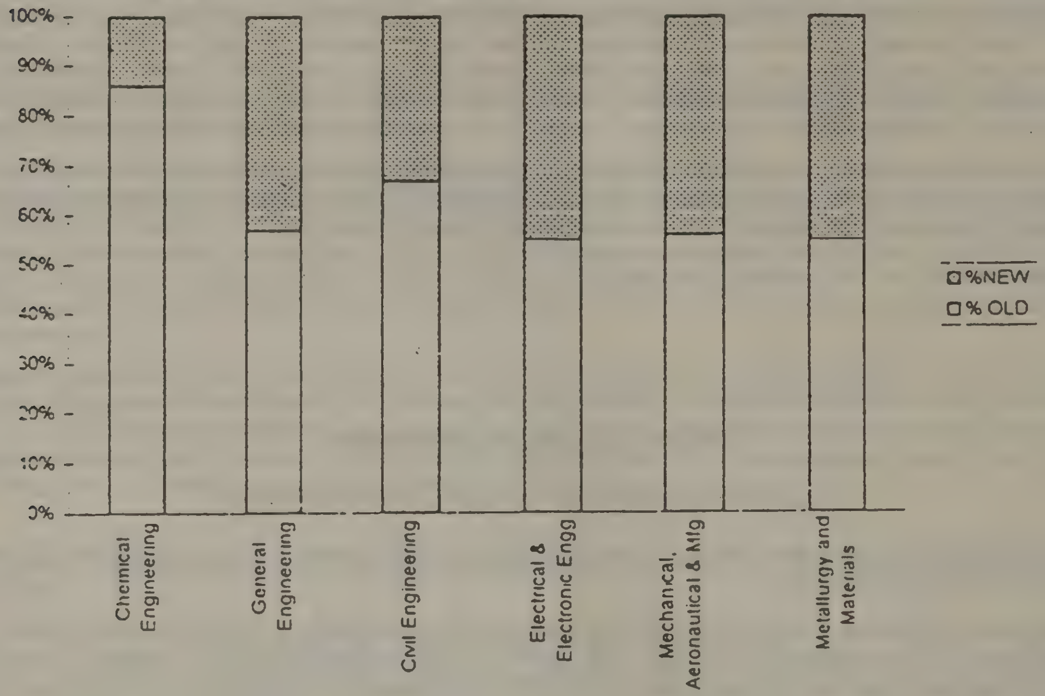
It is possible that chemical engineers are poorer at research than the others and have ignored the signals from 1992 but it seems unlikely. Indeed, within chemical engineering, there has been some improvement, with nine departments improving their ratings, eight maintaining them and only four with worse ratings in 1996 than in 1992.

The explanation must, therefore, be sought elsewhere.

Several assessment panels, including chemical engineering, had difficulty in interpreting the rating definitions. For example, what constitutes "a majority", how many is "some sub areas" etc.? In the 1992 exercise there was communication between the various engineering panels so they had at least some idea of each others' standards. This was not the case in 1996. It is, therefore, at least plausible that the chemical engineering panel retained its standards, while the other disciplines became somewhat more liberal.

It is also interesting that chemical engineering has a much smaller percentage of "new" universities than the other engineering disciplines. This is particularly marked in 1996 with close to 90 per cent "old" universities in chemical engineering compared with close to 60 per cent for the other engineering disciplines (see Figure 1). The "new" universities have only relatively recently engaged in significant research activity and lacking experience, tend to attract lower ratings. It has been suggested that the exposure of the chemical engineering panel to relatively high standards across the board has lead to its standards being higher than those of the others.

FIGURE 1
DISTRIBUTION OF "OLD" & "NEW" UNIVERSITIES IN 1996



Because of the very strong dependence of HFCE funding on the research ratings, with grade 5* receiving more than four times as much Quality-Related funding as grade 3 this will, in many universities, lead to research in chemical engineering departments being proportionately less well funded than other engineering disciplines. For a relatively small, but nevertheless vitally important, discipline like ours this could have disproportionately serious consequences.

The profession is expanding and there is already a shortage of chemical engineering graduates. If shortage of research funds were to lead to the closure of departments this would remove a substantial teaching resource. A recent IChemE survey suggests that the remaining departments would be unlikely to be able to expand their resources sufficiently to compensate.

It is highly likely that the lack of communication between the panels played a major role in causing this discrepancy and must be avoided in the future. Rather than being forbidden, as seems to have been the case in 1996, such communication should be made mandatory in any future exercise.

APPENDIX 18

Memorandum submitted by the British Medical Association

The British Medical Association welcomes the clear commitment to Higher Education contained in the Dearing Report particularly in relation to the amount of work that has gone into its production and the calls it contains for increased funding for the Higher Education sector and for the maintenance and enhancement of the quality of the education provided by the sector. The Association supports the call for additional resources to be put into Higher Education, recognising as did the report, that few, if any, of the key recommendations could be implemented without additional resources.

1. Proposals for an Independent Advisory Council on National Research Policy

It is apparent that the call for such an advisory council has arisen from the recommendations made on securing extra funding for the research councils and the perceived need for an "oversight of research policy and funding" at national level by a single body. The report also raised concerns about the differing principles and aims between the funding bodies and the research councils. The aim of the new advisory council is to take an "objective view" of research funding in the UK and "to identify inconsistencies in the policies of different public bodies, and to make its voice heard at the highest level". (Para 11.105 Dearing Report).

It is not clear from the Dearing Report's recommendations, what is the precise remit of the new advisory council nor the extent to which it will be given authority to assess strategies or redirect funds when and if perceived necessary. The Association is concerned that there are already numerous research councils and funding bodies in existence, all addressing their own strategic agendas, with the Treasury determining their overall funding levels. This financial restrictive element of existing research policy would not change and therefore it is difficult to appreciate the extent to which the independent body would be able to steer future funding. At best it may be seen as a poor attempt to divert the use of funds to "best effect". At worst it would merely add to the number of bureaucratic funding strategies already in place.

2. Alterations to the Research Assessment Exercise and the Balance Between Teaching and Research

The Association welcomes the recognition of the imbalance between research and teaching created by the Research Assessment Exercise (RAE). There are clear advantages in the RAE for institutes of research over non-institutes where the workload is divided between teaching, research and service provision and particularly over medical schools. We believe that this balance needs to be changed.

However, the Inquiry placed responsibility for change upon the individual departments and academic research groups to develop "a stronger sense of co-operation and partnership in order to maximise the benefit from expenditure on plant, equipment and expertise". We believe that a stronger line is required from the centre in order that the allocation of funds for research based and teaching based communities is more balanced.

More importantly, the major problems of the RAE, particularly for medicine, have been largely ignored. Short-term planning by universities reached new depths with the RAE. Investment in core support and staff development has stopped as universities vie with each other to buy in experts who have a good track record of publications in the critical four year period of the next assessment exercise. The money to provide new accommodation for these experts has to come from somewhere. In medicine, the quick fix has been to bring in teams of scientists whose ability to publish research in non-specific journals has been very useful to departments of obstetrics and gynaecology, or other disciplines in which the top journals have small readerships and hence poor citation indices. The new teams have taken over space and often the salaries of departing clinical academics. Although it may be of high quality, the relevance of the new teams' research to the activities of their NHS clinical colleagues is often questionable. Whilst recognising the need to measure quality, the current system of assessment damages teaching. There needs to be a wider base line used, where recognition is given to clinically based research and its relevance to the health of the nation and the NHS.

The quality of all research will be enhanced by development of a clear strategy which identifies and promotes all opportunities for encouraging the quest for knowledge and understanding in students which might lead them into research. The opportunity to undertake research across a broad range of vocations and across HE should be wide open and there must be established adequate funding and infrastructure to facilitate and encourage such research.

The recommendations made by the Inquiry detailing the alterations to the RAE will represent a major change to the funding structure for universities. The Association believes that the recommendation was effectively suggesting that there should be no funding of the research infrastructure from the HEFC grant. In principle, the Association believes that this proposal could have some merit. However, there are serious concerns, namely that there would be fewer granting opportunities and, therefore, less research done and that start-up pilots would not be possible without specific grants. Even now these are almost impossible to obtain, despite the Medical Research Council's recent proposals.

3. The Availability of and Access to Publicly Funded IT Systems by Researchers and Others

The Association believes that access to publicly funded IT systems should be made a priority as it is apparent that the UK is already behind many developed countries. We agree with the Inquiry that the effective adoption of Communications and Information Technology (C&IT) in higher education requires "appropriate technology, adequate resources and staff development". Such facilities will of course require the necessary funding not only in relation to the provision of up-to-date technology but also the adequate spreading of the facilities to all staff in post. The major difficulty faced in universities as far as medicine is concerned is the maintenance of IT equipment and upgrade of technology when necessary. The Association believes that the re-evaluation of central services is urgently required and that a central funding pool be established to keep the existing technology up-to-date.

With regard to the recommendation that by 2000–01 higher education institutions should ensure that all students have open access to a networked "Desktop" Computer, and that by 2005–06 all students will be required to have access to their own portable computer, the Association considers this to be far too bland a recommendation and the deadline too far away. Already, some medical schools are trying to give a lap top to a significant percentage of students. This policy should be given the opportunity to develop in all medical schools immediately. In addition the Association is concerned as to where the resources for this proposal are to come from. It is agreed that the requirement to have a portable computer should not be placed on the student.

4. Proposals for a Research Equipment Loan Scheme

The Association is concerned about this recommendation. It is not clear how this scheme would operate, in particular who will own/buy the equipment; the range of loans available and who would be ultimately responsible for repaying the loans. It is evident that the establishment of "equipment pools" has failed in the past.

We are also concerned at the proposal that funding would need to be selective and should be awarded to support "those institutions able to indicate satisfactory/best practice in managing these assets" (Para 19.60 Dearing Report). This will accentuate differences between universities and may actually prevent universities without expensive equipment from attracting project funding. A downward spiralling effect could therefore be produced. Funding needs to be increased in this area and allocated on the basis of need.

5. Funding for Research Infrastructure

The Association believes that both the public and private funding of research infrastructure in the UK has been too low for too long. The focused distribution of money by research councils no longer provides support for general research infrastructure and is seriously affecting contemplative research, so vital in health care. Public funding for research is currently disbursed on the basis of peer review of grant applications from researchers, who define the topics themselves. Since only a small percentage of grant applications are funded, any critical comment from reviewers or research board members tends to be detrimental. The result is that research boards award funds to individuals who propose research which lacks innovation and has a high certainty of success. Yet many advances in health care come from unexpected sources—predictable research is merely development. The 90 per cent or more applications that fail to gain funding represent an enormous amount of effort. Each one probably represents three months full time work for a senior staff member. We are concerned that under this sort of competition, peer review fails. In our opinion the Dearing Inquiry failed to tackle this problem of the failure of the peer review system to encourage funding of "blue skies" research from the research councils.

However, the Dearing Report did highlight that in recent years the volume of research in higher education has increased without a commensurate increase in funding levels to support infrastructure. The report emphasised that a gap exists between the costs of the research and the combined funding available through the dual support system. The Association welcomes the Inquiry's recognition of these issues and the proposal that extra funding should be allocated to research. However, it is concerned at the proposal that all research council grants should cover realistic indirect costs and include the costs of premises, infrastructural services and central computing, excluding the salary costs of academic staff. This proposal appears to suggest that departments become responsible for managing and understanding their research costs. We believe that such a process will prove particularly bureaucratic in implementation at the local level.

6. The Future of Dual Support Funding Systems and the Roles of the Research Councils and the Higher Education Funding Councils

As already detailed, the Association has particular reservations about the proposed changes to the funding of research infrastructure with regard to the implementation of departmental costed grants. It is apparent that extra funding is required, but these funds should be directed fairly and responsibly and must secure the intellectual and financial interdependency of both research and education. It must be recognised that at the professional and higher educational level, the co-existence of teaching and research benefits both. Research informs education, and education develops the next round of researchers.

7. Funding for Interdisciplinary and Collaborative Research Projects and the Sharing of Research Facilities

The Association welcomes the recommendation that the funding bodies and the research councils should commission a study to evaluate the funding of interdisciplinary research, including incentives and disincentives. However, we also recognise its limited impact. The Association believes that there will need to be a major reassessment of the aims and objectives of the RAE to take account of such research which is vitally important for the future of research in the UK.

8. Proposals for an Industrial Partnership Development Fund

The Report indicates that the Industrial Partnership Development Fund (IPDF) would be set up to "support applied research initiatives in partnership with small and large scale industry, both services and manufacturing". It is understood that the IPDF will be administered by the Department of Trade and Industry and that the money for this umbrella body will be derived from money already spent on schemes for industry/higher education. We are concerned that there is no real attempt to secure more funds for the development of partnerships between higher education and industry and that a new body would merely be created using existing funds. We wonder how such a body would operate in the area of medicine. New directions in encouraging applied research are certainly required. However, it is apparent that greater funds are necessary for this proposal to have any real impact on higher education as a whole.

We are also concerned that the establishment of the IPDF will merely result in focusing research activities on those which are perceived to have an industrial benefit. In effect the IPDF could have a similar effect on research to that of the RAE on teaching, in that it could create a culture focused on research that will have the potential for an immediate return, and not one that could be used to develop and inform future researchers.

29 October 1997

APPENDIX 19

Memorandum submitted by Mr Mark East, Education Customer Unit and Mr Roger M Needham, Microsoft Research Ltd

1. Founded in 1975, Microsoft is the world's leading software manufacturer for personal computers. Microsoft software is designed to offer customers access to a whole new world of thinking and communicating, whether they are at home, in education, in a large organisation or small business. Microsoft Ltd, the British arm of Microsoft Corporation, became the first subisidiary outside the US when it was founded in 1982.

2. The Dearing Report lays substantial emphasis on communications and IT, both as an infrastructural provision and as a means for the delivery of new forms of teaching. It seems likely that provision of networking within institutions, and probably between them, will remain the province of the institutions themselves and meta-institutions such as JISC. This may change however, as ten years ago Cambridge University dug up the city to provide University and College networking since no commercial vendor was prepared to supply what the customer needed. Today the story might well be different.

3. It has been the conventional wisdom for some time that in the future all students will have personal computing equipment and, as a consequence, less institutional provision (and associated expense) will be necessary. Great benefits would flow from this, because institutions would be relieved not only from initial capital provision but also from the burden of depreciation and replacement; they would instead change from focus to the network infra-structure and content development for distance learning. Recruiting good students depends on reasonably up-to-date provision and the need to ensure this is a force for replacing computers that still work perfectly well. It is, however, a great deal less clear when exactly the satisfactory state of all students having their own equipment and bearing the depreciation on it can be exptected to set in. Dearing says around 2005, which is far enough ahead to have been forgotten when that year arrives. I believe that, in truth, we really don't know. If around that time universities are competing with each other for business, it may perhaps appear foolhardy to insist ahead of time on something that adds cost to what students already have to bear. However, Moores Law tells us that computers tend to double the power and halve in price every two years. With this rapid speed of innovation Microsoft estimate that by the year 2001, most HE students going to university will have access to their own Personal Computer. It will be necessary for universities at this time to more readily adhere to industry standards in computing rather than proprietary internal systems. The development of this internal infra-structure needs to start now.

4. Microsoft already provides provision today for students to obtain Microsoft licences at substantial discounts. However, new licence models will be required to better suit the needs of all students on campus, all of whom would need to adhere to the university standard to guarantee effective electronic communication and collaboration.

5. Exploitation of IT for teaching depends even more on the availabilty of teaching material suitable for the purpose. There is, in my view, a lot to be found out about what kind of content and what means of delivery are sensible, effective, and economical for university-level teaching. There needs to be experiment, including trials of methods by people other than those who devised them. I believe we shall see a period of rapid change and experimentation in IT use in teaching. Equally, it is unclear where the material will come from. Will teaching materials be made in universities and shared between them—for example East Anglia using Cambridge's discrete maths material and Cambridge using East Anglia's graphics material? Will digital teaching material come from the companies which produce paper textbooks, and be regarded as the up-to-date form of that industry? Will digital teaching material come from companies like Microsoft so you may be able to buy University99 to go with Office99? A different kind of question is about what scope there will be, or should be, for personal input by a (human) teacher. Microsoft have under development software tools which will help universities and commercial companies alike to develop distance learning models and would be willing to work with selected universities to trial these tools.

6. Because of these questions it will again be wrong to be at all prescriptive about how universities go about their exploitation of IT in teaching. There needs to be a ferment of innovation and competition to find what really works and how to distribute and support it. The UK has a unique opportunity of developing a new export Industry—that of Learning. There is no reason why "the Learning Industry" could not become the UK's biggest Industry in the next 20 years. The Internet will become the primary international communications network; this will reinforce English as an International Language. Virtual classes will increase in size better using the time of our best lecturers and experts. When we add this to the history; culture;

tradition and reputation of the British education system; there may well be a time when foreign Governments outsource their education provision to UK. We must never lose sight of this vision and it would be very sad if scarcity of cash reduced the ferment to an almost imperceptible level, constrained by second-guessing when we don't really know what will work at this time.

30 October 1997

APPENDIX 20

Memorandum submitted by Professor S C Holt, Roehampton Institute, London

The Dearing Committee has recommended that a new Arts and Humanities Research Council (AHRC) should be established as soon as possible (Recommendation 29). This would mean that an additional sum of about £25 million should come from public funds and would include funding for the applied arts. This sum, when added to the £20.5 million granted to the Humanities Research Board (HRB) of the British Academy in 1997–98, would bring the total to over £45 million. While this sum is less than the ESRC normally receives, it is approaching the same order of magnitude.

While I strongly support the creation of an Arts and Humanities Research Council and in particular the strong case made out by Professor Laver, the Chairman of the HRB, for increased funding for research in the Arts and Humanities in Appendix 3 of the Dearing Report, I have some serious concerns about how an AHRC might operate into the next century. After reading the Annual Report of the Humanities Research Board of the British Academy for 1996–97, I am left with the same disquiet that I felt after reading the report of the year before. I am left wondering whether those who represent the taxpayer—ie the elected Government and the appropriate Committee or Committees of Parliament—are aware of the patterns distinguishable in (a) where the money goes and (b) who makes the decisions. If they are, and that is their wish, then I believe the higher education community must accept it.

Practices evolve and adapt themselves slowly in many British Institutions including the British Constitution itself. It happens this way because there is usually no recognisable watershed to enable a thorough review, starting from scratch, to take place in which clear principles are thought out on which practice should be based. I am still hoping that the Dearing Report and the possibility of committing a further £25 million of taxpayers' money to Arts and Humanities research can provide such a watershed.

The matters which I believe should be interrogated revolve around the assumptions which appear to be being made about where research quality actually lies, as measured by the flow of funds between the pre-1992 universities and those institutions in the old public sector. The latter are the former Polytechnics, now New Universities, and the Colleges or Institutes of Higher Education who have been part of the Research Assessment Exercises since 1992. I use the term "old public sector" to describe this category from now on.

The discrepancies in the flow of funds and the institutional affiliation of those who make the decisions are so glaring as to raise the question of whether these matters have been overinfluenced by those whose attitude is based on a tradition which is now out of date, in terms of the development of universities and colleges in the mid-nineties and into the next century.

I am not, repeat *not,* suggesting for a moment that those who represent the sector, and are deciding or advising on the allocation of funds, are doing anything other than honestly exercising their professional judgment according to their own values and the guidelines they are given. Nor am I suggesting that money for research or postgraduate studies should be given out other than on the merits of the people or the projects. The selection of representatives and advisers to do with the disposal of research funds in the Arts and Humanities should similarly be made on merit. I am simply questioning whether there are preconceived and now outdated notions about where merit can be found.

I have no information about how many applications are received for funds by the HRB from institutions in the old public sector. It may well be much smaller than applied to the pre-1992 universities. That would not surprise me, because the record could be considered rather discouraging. What does the record show? I quote from the 1996-97 Annual Report of the HRB and indicate the relevant appendices in brackets as appropriate.

I begin with representation. The Research Board (appendix 2/1) has 19 members of whom only one, Professor Tickner of Middlesex University, is from the old public sector. For Research Committee Panels 44 members are listed of whom only four are from the old public sector. The list of Postgraduate Committee Panel members (appendix 2/3) shows a similar pattern, two from the old public sector out of a total of 33.

Each Research Board member has a group of seven or eight universities with whom they are expected to maintain links. No institution which does not have the university title is on the list even though several Institutes of Higher Education are outperforming some of the new universities in the Research Assessment Exercise. In the case of Roehampton Institute for example, 81 per cent of the academic staff were entered in the 1996 RAE, a rate which falls within the bracket of the pre-1992 universities. This seems regrettably dismissive of those institutions which are trying hard to build up a strong research culture particularly in the Humanities.

Turning now to the allocation of funds, Appendix 5 lists the awards for the Research Leave Scheme. Fifty nine were received in 1996-97, only one found its way to someone in a former public sector institution, ie to Dr K Jeffreys of the University of Plymouth who is writing a political biography of Anthony Crosland.

Appendix 6 lists for 1996-97 small and larger grants and Archaeology Fieldwork and Post Excavation grants and also Applied Science in Archaeology grants. In the last two categories, ie the general field of Archaeology 78 separate grants were awarded. The proportionate share between the different parts of the higher education sector is not relevant here, because the work in this subject area is heavily concentrated in the pre-1992 universities.

However, as far as the 227 small and larger grants are concerned, while a very small number went to independent researchers or small institutions, only 18 went to institutions of the old public sector. (I should and do acknowledge that of those 18, five went to the Roehampton Institute.) The degree of imbalance in the overall figure still seems to me to be extraordinary.

Appendix 7 lists Institutional Fellowships. Fifteen Fellowships were allocated, of which one came to an old public sector institution—the University of Brighton.

The disposition of Postgraduate Studentships under competitions A and B have hidden factors in them which make it difficult to draw very meaningful conclusions. Where taught postgraduate courses are concerned the department which is bidding has to meet certain conditions testifying to its well established suitability. One would expect the pre-1992 universities to be more strongly placed here. However only 10 offers were made in either competition to students in old public sector institutions out of a total of 972.

All this raises in my view some serious questions about the development of research in the old public sector institutions, many of which are now universities. The Dearing Report advises against having teaching-only universities. Research therefore must be given a chance to develop. While the dual system of funding is certainly one answer to this, it seems inappropriate and unfair that where there are academic staff in the old public sector institutions, who can demonstrate the necessary high standards of research excellence, they should be marginalised both in funding and representation. I believe there are now many of them who could be used as representatives and advisers. I have most knowledge of my own institution where our Professor of History is a Fellow of the British Academy and two of our Professors in the Arts and Humanities Faculty head Departments which obtained a four in the 1996 Research Assessment Exercise. (One of our Professors of English is already on the English and American Literature Panel).

I am aware of course that the HRB uses a wide range of specialist advisers on particular projects. I have no access to information about the institutional affiliation of those advisers. It may show a different pattern from the one I have shown above in this submission. The Committee may like to ask.

There may well be quite reasonable answers to all the problems I have raised here. If so, I would be happier if they are heard and taken into account before the terms of reference and guidelines for a new Arts and Humanities Research Council are set up.

31 October 1997

APPENDIX 21

Memorandum submitted by Manufacturing, Science and Finance

INTRODUCTION

1. Manufacturing, Science and Finance (MSF) is a trade union with a large proportion of its membership working in Science, Engineering and Technology across both the public and private sectors. We represent 13,000 research support staff in higher education and MSF members also work in the National Health Service, Medical Research Council, pharmaceutical industry and industrial research and development establishments.

2. Research support staff make an important, but largely unacknowledged, contribution to research in higher education institutions. They were also the staff group targeted by the funding changes introduced through the dual support transfer in 1992 and will be affected by any further changes to the dual support system.

PROPOSALS FOR AN INDEPENDENT ADVISORY COUNCIL ON NATIONAL RESEARCH POLICY

3. MSF welcomes the proposal for an independent body to advise on the direction of publicly funded research. We also believe there are two further functions which could usefully be carried out by such a body; ensuring transparency of funding decisions and safeguarding the long-term ability of the UK to conduct research.

4. The decisions of the Funding Bodies and Research Councils can have a wide-reaching effect on all grades of higher education staff, their careers and future employment prospects. As such, information about the allocations and grants made by these bodies should be in the public domain.

5. The lack of research funds over recent years has forced research groups and institutions to make short-term decisions about funding at the expense of long-term planning. There is now an urgent need for a body to review the effect of current research funding arrangements on our long-term ability to conduct world class research.

6. We disagree with the Dearing Committee's recommendations that advice be given to ministers in private and we would want the advice to be open to public scrutiny.

Alterations to the Research Assessment Exercise and the Balance Between Teaching and Research

7. Whilst MSF recognises the need for some means of monitoring the research of higher education establishments, we believe that the Research Assessment Exercise (RAE) is seriously flawed by not taking into account the quality of and investment in research support services, possibly by an accreditation system similar to that used by the NHS Pathology Laboratory Service and Good Laboratory Practice (GLP) in the Pharmaceutical Industry. We believe that rewarding departments for the standard of the services provided is just as important to the research effort as rewarding the level of research activity.

8. We are also concerned that the system discriminates against those departments and institutions attempting to build a research reputation. A cyclic process is emerging whereby the RAE determines the amount of research funding from other bodies and the research carried out with this funding determines the next RAE. There is a perception that the ground rules are continually changing and some departments are better informed than others about what to expect. This problem could be alleviated by ensuring all departments are informed at the end of one exercise what criteria to expect for the next RAE. We also believe the Funding Bodies should provide start-up funds to help establish the reputation of new researchers.

9. MSF is opposed to a further concentration of research funds as recommended by the Dearing Committee. We believe the Government should accept responsibility for its predecessor's decision to change the status of polytechnics and provide extra research funding for the increased number of universities. However, it would help relieve the pressure on the funds available for research if those establishments choosing to concentrate on taught degrees were able to obtain adequate funding from non-research sources. We believe the promotion of a culture which recognises academic and skill-based degrees as being equivalent will be essential for such establishements to thrive.

The Availability of and Access to Publicly-Funded IT Systems by Researchers and Others

10. MSF supports the proposals for a more detailed review by the Joint Information Systems Committee. We would also like the Committee to make recommendations on the provision of adequate support for IT systems in higher education establishments.

Proposals for a Research Equipment Loan Scheme

11. We agree with the Dearing Committee that the deterioration of equipment in higher education institutions needs to be addressed as a matter of urgency and requires a long-term solution. We also agree that the Private Finance Initiative would not provide a satisfactory solution to the problem. We do not agree with the proposal that funds should be limited to selected research departments or establishments.

12. The fund should be set up with initial funding from Government. We do not believe it would be realistic to depend on contributions from the various research sponsors given the level of indirect costs currently expected of them and subsequent growth would have to be achieved through the interest charged plus any further donations from public funds. The funds should also be available to assist with major equipment maintenance costs.

Councils and Higher Education Funding Councils

Funding for Research Infrastructure

13. The main concern MSF has about the current dual funding arrangements is the devastating effect on research support services and staff. The funds transferred from the Funding Bodies to the Research Councils in 1992 which were originally intended to finance research support staff have been used instead to increase the number of research projects supported as demonstrated by the increased volume of research activity identified by the 1995 Coopers & Lybrand report. The distinction between direct and indirect funding of staff costs was never achieved and legitimate research support staff costs were not paid. There is also a widespread perception amongst researchers that only the cheapest grants will be successful in winning funds and the true support costs associated with a research project are often not claimed. Researchers also feel pressurised to claim for the cheapest staff alternatives and not the most applicable.

14. The dual support transfer has therefore failed in its objective to increase the transparency of research costs and has led instead to the progressive underfunding and erosion of research support services which now threatens to damage the long-term ability of our higher education institutions to support world class research

programmes. The current loss of skilled technical staff and the lack of technical training available for young people will, if left unchecked, lead to a deficit in technical skills and expertise that will be very difficult and expensive to replace.

15. In addition, MSF believes that a further transfer from the Funding Bodies would undermine the finance available to "blue skies" research. Departments and institutions also need to be able to plan for longer-term research programmes than Research Council grants currently provide for.

16. The first priority of the Research Councils is to provide funding for as many research projects as possible. We believe this to be incompatible with the responsibility for long-term maintenance of research infrastructure and support services. Increasing indirect costs would only be a partial solution and might also drive some research sponsors out of higher education institutions. If this solution is chosen, a number of the problems associated with the current dual funding arrangements would also have to be solved. Institutions should be required to use the funding from indirect costs to maintain infrastructure and support services, clarification would have to be achieved on the distinction between direct and indirect staff costs and researchers would have to be encouraged to claim for the true costs associated with research projects.

17. MSF believes it would be preferable to transfer responsibility for providing the facilities and services traditionally known as the "well-found lab" back to the Funding Councils under revised arrangements. We believe that other research sponsors would then be more inclined to donate to an equipment loan scheme.

18. MSF is opposed to the introduction of student fees and we believe that charging tuition fees could have a detrimental effect on the numbers of students continuing with postgraduate research-based qualifications. If tuition fees are introduced, the funds raised should be directed back into the higher education system to maintain the infrastructure and support staff costs for teaching and research.

Funding for Interdisciplinary and Collaborative Research Projects and the Sharing of Research Facilities

19. MSF supports the Dearing Committee's proposal for an inquiry into the effect of the Research Assessment Exercise on interdisciplinary research and we believe the remit should also include collaborative research and sharing of research facilities.

Other Issues

20. We are disappointed that the Dearing Committee did not take the opportunity to examine the problems associated with the use of short-term contracts in higher education institutions more closely and we would welcome further consideration of this issue by the Select Committee.

21. We also believe the difficulties encountered by higher education institutions in applying for EU grants need to be reviewed in more detail.

22 November 1997

APPENDIX 22

Memorandum submitted by The British Academy

1. The British Academy is an independent learned society, the national Academy for the humanities and social sciences. It is the principal channel, outside the universities, for the Government's support for research in the humanities, and in the absence of an officially constituted Humanities Research Council it has come increasingly to fulfil that role. It receives a Government grant-in-aid, which in 1997–98 totals £28 million. Most of the Academy's grant-giving responsibilities in the humanities have, since 1994, been devolved to the Humanities Research Board of the British Academy (HRB), following a decision by the previous Government not to create a Humanities Research Council.

2. In this Memorandum the British Academy expresses its support for the Dearing Report's recommendation that a new Arts and Humanities Research Council be established, subject to certain assurances about its nature, constitution and funding, and about future support for the Academy itself.

Questions 1 and 2: the creation of a new Arts and Humanities Research Council, and the abolition of the Humanities Research Board of the British Academy

3. By common consent the HRB has worked well, and has won the confidence of the academic community, albeit on a very small budget, especially in relation to the support of advanced research[1]. There are, however, two principal defects of the present arrangements, which relate to the level of financial support for research

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[1] The HRB's budget for 1997–98, from the Academy's grant-in-aid, is £20.75 million, of which £18.3 million is for postgraduate awards and £2.45 million for research.

in the humanities and to the absence of a humanities voice and a seat at the table in official forums where issues relating to the public funding of research are decided.

4. In its evidence to the Dearing Inquiry the British Academy stated that, as a means of addressing those defects, it would favour the creation of a Humanities Research Council (and the inclusion of the creative and performing arts within its remit), subject to assurances that

- adequate additional, ie new, money was being made available;
- full account was being paid to the special nature of the humanities in the Research Council's mission statement;
- appropriate steps were being taken to ensure that the humanities did not suffer disadvantage within the administrative structures of the DTI, if the decision were taken to place the new body with the other research councils within the OST;
- the Research Council was appropriately constituted; and
- the Academy's own position was safeguarded so that it was treated as fully analogous to the Royal Society in the way it stood in relation to the Research Councils.

5. The recommendations of the Dearing Report appear to address the Academy's central concerns, and to provide many of the assurances sought. The Academy, therefore, welcomes the proposal to create an Arts and Humanities Research Council (AHRC), and envisages that the new body will simply replace the present HRB. In its response to the Dearing Report (which is appended to this Memorandum) the Academy did, however, emphasise certain reservations which related to meeting the assurances listed in paragraph 4 above. Moreover, joining the humanities and the arts in a single council could give rise to difficulties, since research in the humanities is quite different in nature from some categories of activity defined in the Dearing Report as research in the creative and performing arts[2].

QUESTION 3: THE NEED FOR ADDITIONAL FUNDS TO SUPPORT HUMANITIES AND ARTS RESEARCH

6. The Academy welcomes the Report's recognition that the humanities (and the arts) are substantially under-funded at present, and its judgment that "around £25 million in additional funds is required", to be provided by "additional public funding". The Academy strongly supports these conclusions, which, it understands, are based partly on a comparison with the ESRC and its funding for the social sciences[3], and partly on the relative costs of research in the humanities. It must be stressed that the need is for genuinely new money which makes for a real addition to the funds available for research in the humanities and the arts. To fund the AHRC by means of transfers from existing funding bodies (such as HEFCE), would be unacceptable—especially as the new Research Council is expected to provide for research in the arts, for which the HRB has not had responsibility hitherto, as well as the humanities. If it should prove to be impossible to make available genuinely new money, then the Academy would prefer maintenance of the *status quo*, especially as the creation of a Research Council will require significant extra expenditure to meet administrative costs.

QUESTION 4: FUTURE SUPPORT FOR THE BRITISH ACADEMY AND ITS ROLE AS ANALOGUE OF THE ROYAL SOCIETY

7. What Dearing has to say, both about the need to protect the financial position of the British Academy and about its treatment as analogue of the Royal Society, is reassuring and welcome. The transfer to the AHRC of the grant-giving functions that the Academy has delegated to the HRB from within its overall grant-in-aid will obviously have a significant impact on the Academy's activities as a whole. But the importance of the Academy's fundamental objects, to promote the study of the humanities and the social sciences, will not be diminished; nor will the maintenance of those other grant-aided activities which are the responsibility of the Academy—such as Research Professorships and Readerships, Postdoctoral Fellowships, international exchanges, conference grants and small research grants, and support of the overseas British Research Institutes (such as the British School at Rome and the British School at Athens).

8. The Academy's approved statement of purposes explicitly refers to the analogy with the Royal Society: ". . . As the national academy for the humanities and the social sciences, it is the counterpart to the Royal Society which exists to serve the natural sciences. The British Academy's purposes, within the scholarly disciplines it promotes, are:

- to represent the interests of scholarship nationally and internationally;
- to give recognition to excellence;
- to promote and support advanced research;
- to collaborate with the Royal Society and other learned bodies;
- to further international collaboration and exchanges;

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[2] See Paragraphs 6–8 of the paper attached to this Memorandum.

[3] The ESCR's grant for 1997–98 is £64.9 million.

— to promote public understanding of research and scholarship in the humanities and the social science; and

— to publish the results of research . . .”

9. These purposes, and the activities that support them, will not lose their significance following the establishment of an AHRC, nor the validity of their claims to public support. Just as the Royal Society stands in relation to the five scientific research councils, and receives public funding for approved programmes and activities which fall outside the remit of those research councils[4], so should the Academy stand in relation to the ESRC and the AHRC. It needs to be emphasised, however, that if the Academy’s role is indeed to be fully analogous to that of the Royal Society, then there will need to be additional funding provided in relation to the Academy’s support for the social sciences, and for such programmes and schemes as those mentioned above, extending across the humanities and the social sciences, for which support is either non-existent or on a considerably smaller scale.

27 November 1997

APPENDIX 23

Letter to the Chairman of the Committee from the BioIndustry Association

I am writing to you, as a member of the Science and Technology Committee, on behalf of the BioIndustry Association.

The association represents a wide spectrum of biotechnology companies in the UK, whose businesses use biotechnology as an essential part of their research and production, or who supply this sector. Our members are, almost by definition, modern companies who depend on the science base of this country for their products and growth. The technology we use, and the staff we employ, have in great measure come from academia.

We welcome the opportunity the Dearing report offers for a close look at higher education in the UK. The report is lengthy, but we wish to concentrate on one particular set of recommendations. These relate to the funding of research (chapter 11). The report draws attention to the need to fund, or perhaps re-fund, the infrastructure of UK institutions. We would not disagree with the need for a sound infrastructure—the worry lies in the proposed solutions.

I take the liberty of setting out the argument in the form of a list.

1. The BIA has a key objective of “stimulating science teaching and research in universities” and notes that a strong science base is the wellspring of the industry. (Set out in the BIA Charter for BioIndustry.)
2. A large proportion of member companies collaborate with universities through CASE, LINK projects, join funding etc.
3. The Dearing report seeks to increase overhead payment levels from the research councils from ca 45 per cent to 60 to 100 per cent.
4. It is unlikely that research council funds will be increased, so the number of grants will fall, while providing the same amount of money to universities.
5. Universities will seek to increase overhead payments from industry, and charities, by a like percentage.
6. University accounting procedures are not capable, in general, of justifying the overheads charged, a matter which the Dearing report concedes.
7. Member companies that currently fund research in universities will be faced by three choices: pay more, carry out research in-house, collaborate with US academic institutions.
8. The decision will depend on the individual circumstances, but increased overhead charges on the scale suggested will certainly increase the attractiveness of in-house research. This can frequently be more focused on the end product than research in academia, but in the long term this will erode the universities science base.
9. The US (or European) collaboration route will erode both the UK universities and the UK national science base.
10. By offering wide experience and contacts within the university community, research in a university has valuable attractions, but universities are not monopoly suppliers and could price themselves out of the market to the long-term disadvantage of UK industry and employment.

The BIA is very concerned about the risk to the science base of the UK should short-term financial considerations lead to a loss of expertise, knowledge and industrial funding from the UK. R&D is an international market and where research leads production is likely to follow. There are good examples of this, especially in biotechnology. If UK costs become disproportionate, larger companies will move collaboration overseas, smaller companies may stay in the UK but pay disproportionately high costs.

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[4] The Royal Society’s grant-in-aid for 1997–98 is £22.3 million

The BIA asks that your committee examines most carefully the proposals for increased overhead/infrastructure costs. Industry does not seek subsidy, but needs to see costs properly justified, and set at a level where UK academia, and thus our science base, remains competitive in the international R&D marketplace.

I will be glad to provide any further information that you require.

28 November 1997

APPENDIX 24

Memorandum submitted by King's College London

SUMMARY

1. King's College London is a multi-faculty college of the University of London. We have recently merged with the Institute of Psychiatry and plan to merge on 1 August 1998 with the United Medical and Dental Schools of Guy's and St Thomas's Hospitals. Together our research income from grants and contracts in 1996–97 was £75 million, making us the fifth highest university research earner in the UK. At the 1996 Research Assessment Exercise, our institutions achieved nine five-star ratings (international excellence) with over 75 per cent of our submissions judged four or above (at least national excellence). We submit evidence as a research-based teaching institution that will be directly affected by HMG decisions resulting from the Dearing Report.

2. King's College London fully supports the evidence given by the Committee of Vice Chancellors and Principals (CVCP) on Wednesday 12 November 1997. Our evidence concentrates on two interrelated issues, the lack of investment in research infrastructure and the research funding gap. Substantial funds are needed urgently to solve these problems if the UK university sector is to remain internationally competitive. HMG must inject a significant proportion of this additional funding to at least close the Research Council funding gap. This should catalyse additional funding from other providers. A transfer of funds from the Funding Councils to Research Councils is an unacceptable option, since this would benefit very few institutions, destroy infrastructure in others, stifle initiatives and shift resources out of some disciplines, especially Medicine, Law, Education and Humanities. In the absence of additional HMG funding, research in the university sector will contract to the detriment of HMG objectives of increasing wealth creation and improving the quality of life.

EVIDENCE

3. The College supports the view of the Dearing Committee that "There is an urgent need to put right past under-investment in the research infrastructure. The resources must be found to enable the UK to maintain its place as one of the world's major research centres. Without it, our universities will no longer be able to attract funds from industry or international institutions on the scale they have in the past." (Paragraph 55).

4. This view is consistent with the College's (pre-merger) submission to HEFCE/CVCP in respect of the "Survey of Research Equipment in UK Universities" PREST/CASR report which indicated an equipment shortfall (excluding computing equipment) of at least £10 million. The UK university research equipment shortfall was estimated by PREST/CASR at £474 million.

5. Additionally there is a UK annual funding gap of at least £530 million and growing fast resulting from the volume of grants and contracts undertaken by universities for a range of clients (including HMG) and which are inadequately funded as the indirect cost element is not fully recovered. The more successful a university becomes in attracting research grants and contracts, the greater its funding gap which is subsidised by lack of investment in infrastructure and through the Funding Council grant (and therefore crowding out academic research time). The problem for King's College London and other leading research universities is acute.

6. There is a clear need for both a short and longer term strategy to solve these problems. The short term can only be addressed by the urgent provision of additional funds by HMG over the next 1–2 years, if necessary targetting funds to top-rated institutions. In the longer term, serious consideration will need to be given to how best to provide additional funds particularly in view of the apparent reluctance of the private sector to fund the infrastructure needs of universities. This brings into question the viability of an infrastructure revolving loan fund and an Industrial Partnership Development fund, although it is recognised that if either were to gain support, aided by strong HMG backing, such funds could provide a useful contribution to the longer term.

7. King's College London supports the need for projects and programme grants funded by the Research Councils (and indeed from other sources such as HMG Departments, European Union and industry) to meet their full costs as identified via appropriate full cost accounting. Full costs should contain all indirect costs including the cost of premises and central computing. We endorse the principle that these costs should be met through the provision of additional resources. For Research Councils the gap in funding is at least £110 million per annum. As recommended by the Dearing Committee, this gap must be fully funded by HMG to

maintain the UK at the forefront of international scientific research. Closing the Research Council funding gap should also catalyse other funding sources including UK industry into paying full costs.

8. We are concerned by the suggestions following from the Dearing Report that, in absence of additional money from HMG to solve the Research Council funding gap, funds should be transferred from the Funding Councils or fewer research project/programme grants should be awarded. We will discuss these undesirable alternatives in turn.

9. King's College London affirms that the dual support funding system whereby universities access funds from both Funding Councils and Research Councils is the cornerstone of excellence of research in our sector providing flexibility, enabling initiatives and protecting the longer term. Specifically, further erosion of the Funding Councils' QR funds, awarded competitively via the Research Assessment Exercise and supporting quality, to subsidise the Research Council funding gap would result in several damaging consequences, viz:

(i) A benefit for a very small number of institutions whilst destroying the academic infrastructure of the remainder.

(ii) The concentration of funding in short term projects, often targetted at current HMG policy, whilst preventing seed money investments to retain international competitiveness and to undertake speculative research. King's currently has two pharmaceuticals under clinical trials where the initial research was funded from QR funds after bids to a Research Council were unsuccessful.

(iii) A structural shift in the funding of academic disciplines with substantially less money devoted to Medicine, Law, Education and Humanities.

10. We particularly wish to comment on the damage such a structural shift would cause, since this serious consequence of a dual support transfer is not widely understood. Our College has examined the effect of such a transfer for a range of academic disciplines. Even the Institute of Psychiatry, the foremost institute in its field and five star-rated with substantial MRC funds, would lose money from such a transfer. We estimate approximately 5 per cent less research funds would be available to the Institute, thereby harming its ability to retain its international position. UMDS and King's College Medical and Dental School would lose 10-15 per cent of their research funds. Our Schools of Humanities, Education and Law which are predominantly highly rated (5* or 5) units of assessment, would experience a similar reduction in funds, even if the propsoed Arts and Humanities Research Council is established.

11. This structural shift in funding if QR funds are reduced to enable Research Councils to fully fund projects and programmes, is due to Medicine, Humanities, Education and Law receiving substantial funding from UK Charities but relatively little (or no) funding from Research Councils. UK Charities have a policy of not paying the indirect costs of projects which are partially supported through QR funding. Hence if QR funds are reduced, Medicine, Humanities, Education and Law will suffer disproportionately. This would be inequitable particularly in the light of:

(i) the substantial reduction in funding for preclinical sciences which has occurred since 1993–94 and the loss of QR funding by many medical schools associated with teaching hospitals following the 1996 Research Assessment Exercise.

(ii) the phased reduction in QR funding over 1997–2000 in non-laboratory disciplines such as Humanities, Education and Law.

HMG is committed to research which leads to both wealth creation and to enhancing the quality of life. If the second part of this commitment is to be realised, QR funds must be maintained whole.

12. In the absence of substantial additional HMG funds to close the research funding gap and given the imperative of protecting QR funds, the remaining option is a reduction in the number of Research Council funded projects. While undesirable, particularly given the large number of α rated projects which remains unfunded at present, this option at least avoids the problems identified in paragraphs 9–11. However, a phased introduction of funding the full costs of projects would be necessary if Research Councils are to avoid a major reduction in the number of new grants to be awarded over the next 1–2 years. This could be achieved by only applying full cost funding to new awards.

29 November 1997

APPENDIX 25

Memorandum submitted by The Royal Institution of Great Britain

1. Introduction: The Royal Institution—Small Laboratory, Wide Contacts

The Royal Institution's Davy Faraday laboratory is arguably the world's longest continuously operating research laboratory, having started in 1799. It is also one of the smallest housing only three research groups totalling some 35 people. Despite that it is extremely productive, both in volume and quality of science. Two ways in which this result has been achieved are (a) through its network of interdisciplinary contacts and collaborators and (b) through its access to major central facilities operated for, and shared by, the UK academic research community as a whole. In turn it makes some of its own specialised equipment available to researchers in London and the south east. It is on this basis that I write.

2. Multidisciplinary and Interdisciplinary Research

It is a truism that the most potent sources of novelty in science lie at the interfaces between mature disciplines: chemistry and biology in molecular genetics, or chemistry and physics in liquid crystals are two disparate examples. To bring about, and then manage, such confluences between diverse fields ought therefore to be a high priority for the health of UK science. For Universities, the question is, how best to create circumstances that preserve and, where needed, enhance the necessary flexibility within the context of a departmental structure. One should also distinguish a multidisciplinary approach, in which recognisable academic disciplines contribute to solving a problem by working in parallel, from true interdisciplinary. The latter implies that the old lines of demarcation have dissolved, and that a new discipline has been born, with its own distinctive approach. Where that occurs it has important repercussions for funding mechanisms, both through the Higher Education Funding Council (HEFC) and the Research Councils.

As far as HEFC is concerned, both the Units of Assessment that form the basis of the four yearly Research Assessment Exercise, and the "quality research" (QR) funding that flows to the universities as a result, are conceived along the departmental lines traditional to undergraduate teaching. I would contend that there is no self evident logic compelling the research enterprise to be compartmentalised along the same lines. On the other hand, the Research Councils have always been more flexible in their approach to interdisciplinary research, for example through establishing the system of Interdisciplinary Research Centres, which have encompassed such topics as bio-engineering, structural and functional polymeric materials and opto-electronics.

There can be no doubt that increasingly basic research is taking on the 'task force' approach when attacking novel fields: by that is meant that the topic area is identified first, and the team required to tackle it is subsequently assembled from the appropriate mix of relevant disciplines. An example is our own recent work on molecular superconductors where, to make progress, we have needed the varied skills of chemical synthesis, X-ray crystallography and solid state physics in equal measure. Given modern communication methods, the team of complementary skills does not have to be brought together in the same place or even (as in the case of the European Commission TMR Networks and COST Actions) in the same country. But to make progress what is definitely needed is (1) an administrative environment flexible enough to identify and support interdisciplinary work, which is in turn conditioned by (2) an appropriately structured funding regime.

To bring about these circumstances it is important that the HEI's, where most of the nation's basic research is conducted, retain (and if possible increase) their ability to nurture such developments. To that end, two requirements need to be met. First, it is vital that decisions to allocate part of the funding needed to initiate new research directions should remain in the hands of the universities. In that way decisions can be made quickly at local level, and within a less rigid framework than that required by the Research Councils. That makes it possible to give seed money, especially to imaginative young investigators who would find it very difficult to get core funding from a Research Council for a novel approach that may not fit the Council's current policies. In such a subtle and fast evolving matter as basic scientific research, no one organisation should have a monopoly of funding decisions.

In the Research Councils, who fund the majority of basic research in HEI's there is also a need for greater flexibility, in particular in the manner in which they approach the issue of Technology Foresight, and implement its conclusions. The first Technology Foresight Initiative had glaring deficiencies in dealing with interdisciplinary issues; two examples will suffice. First, the Chemicals Panel had no representatives from other disciplines, and thus took a predictably narrow view of the future impact of chemicals; second, the IT and Electronics Panel contained no chemist, though chemistry plays the leading part in fabricating IT components. Finally, a too rigid implementation of the findings of such a flawed process by the Research Councils will certainly be inimical to creative novelty, especially of an interdisciplinary kind.

3. Sharing Facilities: A Catalyst To Interdisciplinarity

Equipment for research in all fields of science is becoming inexorably more expensive. Sharing major pieces of apparatus between groups of researchers is therefore increasingly common. In the context of interdisciplinarity that is certainly a trend to be encouraged, since generic equipment, for example X-ray diffractometers for crystal structure determination, are capable of being deployed to solve a wide range of problems across many fields. Not only is that cost effective, but it fosters links between practitioners in fields that otherwise might not make contact.

Shared facilities may operate at different levels, local, regional, national or multinational. An example of a local facility is the SQUID magnetometer housed at the Royal Institution, funded by EPSRC and used about half time by groups from Colleges of London University and other parts of the south east. Samples studied range from superconductors to metalloenzymes. Universities should be encouraged to host regional facilities, eg for high field NMR, bought with Research Council grants but maintained with HEFC funds. On the largest scale (eg synchrotron X-ray and neutron facilities) the Research Councils (through CCLRC) are the providers of instrument time for an entire community of users, numbering some hundreds and covering every discipline in the physical and biological sciences. Such so-called "central facilities" provide a unique opportunity for researchers from departments that receive only modest HEFC research support to access world class equipment for their work. Continuously upgrading these facilities, mainly sited away from university campuses, is nevertheless a cost-effective way of maintaining the health of university-based research.

4. CONCLUSIONS

Novelty crucial to the continuing health of UK basic science frequently arises at the interfaces between mature disciplines. This memorandum identifies several factors important in fostering interdisciplinary research.

- HEI's should continue to receive funds to encourgae unusual and promising developments, especially arising from young members of staff. The Research Councils should not be the only channel of government funding for university-based research.
- The Research Councils should be encouraged to treat the conclusions of Technology Foresight as indicative rather than prescriptive. Future Foresight Panels should have a stronger interdisciplinary base.
- Local and national shared facilities should be promoted through the Research Councils for the benefit of university-based researchers.

1 December 1997

APPENDIX 26

Memorandum submitted by The Treasury

This memorandum addresses the five issues identified in the letter from the Clerk of the Committee of 17 November.

INTRODUCTION OF RESOURCE ACCOUNTING ON FUNDING FOR UNIVERSITIES

2. Treasury officials submitted the accompanying memorandum to the Education and Employment Select Committee on 13 October. This explains the general principles underpinning the control and planning of public expenditure, including that on universities and student support.

3. Treasury Ministers are currently reviewing the treatment of student loans in the light of the Dearing report recommendation 80.

REVOLVING LOAN FUND

4. Advice on this matter was provided by the Treasury to Sir John Cadogan when he was asked a similar question by the Committee; this was reflected in the Supplementary Memorandum which he submitted to the Committee on 26 November. But to summarise the position again, the Government would have to consider carefully giving large sums of money to a fund that it neither owned nor controlled. If the fund was not set up in the public sector—that is, if the fund was neither owned nor controlled by government—then the transactions of the fund would not affect the PSBR. However, any government payment to, or receipts from, the fund would affect the PSBR. All lending, on whatever terms, would increase the PSBR when the loan was made and reduce it when the loan was repaid.

5. This is the purpose of the PSBR—to measure the public sector's requirement to borrow. The borrowing, whether for loans or for grants, adds to the National Debt. It also increases debt as measured for the Maastricht Treaty—Gross General Government Debt. By contrast, the Maastricht measure of deficit—General Government Financial Deficit—excludes loans and thus in effect recognises that these are assets. Both the PSBR and the Maastricht measure of deficit were published in Table B1 of the November 1997 "Pre-Budget Report—Securing Britain's long-term economic future" (Cm 3804).

ACCOUNTING FOR PUBLIC MONEY SPENT ON UNIVERSITIES

6. DfEE are better placed to give details on the funding arrangements they have put in place with the Higher Education Funding Council for England. But the Treasury agrees that it is vital there should be a transparent set of performance and output measures which would enable the universities to be held to account for the large amount of public money spent on university teaching and research. The Treasury has been discussing these issues with DfEE and the funding council for some time and are keen to see early progress. The introduction of resource accounting should help to facilitate this.

RESEARCH FUNDING

7. The relative priority to be given to research funding is a matter for the DfEE and DTI/OST departmental spending reviews, the outcome of which will be announced next summer. They will be considering whether better value can be extracted from existing research funding as well as the case for additional money.

TUITION FEES

8. The Government has announced that savings resulting from the introduction of tuition fees will be reinvested in universities and colleges. No decision has yet been announced on the distribution of these funds beyond 1998–99.

4 December 1997

APPENDIX 27

Memorandum submitted by the University of Plymouth

INTRODUCTION

The University of Plymouth is one of the most research-active (and successful) of the 1992 universities. In the 1996 Research Assessment Exercise, seven of its units of assessment were graded at 3A and, with such a large proportion of its research being rated as of national or international standing, the University is most concerned about the future funding of research from the public purse.

1. *We support the retention of the dual support system*

All HEIs should retain some level of central funding for research in order to support their basic research infrastructure and fund strategic initiatives. A move to fund research solely by peer-reviewed, project-orientated grants would be a retrograde step, which would severely reduce the scope and vitality of research in many HEIs. In the specific case of the University of Plymouth, we believe that it would significantly reduce our ability to respond to local and regional research needs and, thus, undermine the standing of our institution as a key regional research resource.

2. *We recognise that high quality research must be supported*

We fully accept that the research generated in all HEIs must be subject to the same levels of quality control and we have no problem with a system that relies on external peer review.

3. *We argue that the present level of selectivity is broadly acceptable*

The present methodology for the allocation of funds, whereby the leading research universities receive the bulk of the available funds is broadly acceptable, but there should be no further percentage reduction in the already limited funds that are allocated to other HEIs. To do so would severely damage the research base of the UK, as it would effectively disenfranchise that important minority of high quality research-active staff not employed by the small minority of top research institutions. We believe most strongly that such centralisation would severely damage those regions of the UK, such as the South West, that rely on their "local" university for research expertise. It is essential that a balance be struck between rewarding excellence and incenting young and emergent research groups.

4. *We argue that further centralisation of research funding would have a particularly detrimental effect on some subjects or disciplines*

Much research of national and international importance in areas such as Social Work, Nursing, Art and Design etc. is undertaken in universities that would not be classed as leading research universities. These, and other, subject areas would be seriously disadvantaged by a further narrowing of the institutional funding base, counter to the strictures in the Dearing Report about the need to encourage applied research and the needs of the end-users of research findings.

5. *We argue that the concept of the well-found laboratory should be retained*

In many areas of science and engineering the money generated by non-project-related allocation (ie the RAE) allows HEIs to maintain and upgrade their equipment and facilities base in a planned and phased fashion. In these subjects this is an essential part of strategic planning. The provision of such facilities is absolutely essential if the quality of undergraduate (not to mention postgraduate) teaching is to be maintained. This direct link between research and the quality of teaching must continue to be acknowledged as a matter of prime importance.

16 December 1997

APPENDIX 28

Memorandum submitted by the University of Ulster

INTRODUCTION

The University of Ulster is one of two institutions of higher education in Northern Irealnd.

The University's research programme, like that of other UK higher education institutions is assessed in the national Research Assessment Exercise (RAE).

In Northern Ireland 64 per cent of civil R&D is undertaken in the universities.

Comments on Dearing Report Recommendations with Implications for the Structure and Funding of University Research

RECOMMENDATION 29

The University welcomes the recommendation that a new Research Council for the Arts and Humanities be set up as part of the general development of the Research Councils. It is felt, however, that funding for an Arts and Humanities Research Council should be new and not be taken from the allocation to the Higher Education Funding councils nor the existing Research Councils. It is hoped that the proposed new Research Council will develop a specific regional strategy incorporating the individual needs of all regions and in particular Northern Ireland.

RECOMMENDATION 30

The University supports the recommendation that companies should be encouraged to incorporate into their strategic plans a relationship with higher education. However, some incentive is required to promote such a development. It should be noted that in Northern Ireland 97 per cent of companies are SMEs for whom research bears high risk and there is a need for government support. It is suggested that in order to promote University/company links, government—in Northern Ireland through the Industrial Research and Technology Unit (IRTU)—should establish a flexible pool of funding and provide a sliding level of support to companies based on their size.

RECOMMENDATION 31

The University welcomes the recommendation that postgraduate research training be expanded to include a range of core skills. The University of Ulster, through the development of a Master of Research programme, has provided such training for the last two years, and continues to do so, largely with the support of the European Social Fund (under EU Structural Funds).

RECOMMENDATION 32

The University recognises the difficulty faced by Research Assessment Exercise panels in the evaluation of interdisciplinary research and understands the recommendation for a study to investigate the process. It is felt, however, that the RAE system facilitates and rewards collaboration involving more than one Unit of Assessment and/or more than one institution.

RECOMMENDATION 33

The University understands the recommendation to include international members on RAE panels. However, it is felt that this would prove difficult in practice and that it is unnecessary. Some of the larger multidisciplinary Units of Assessment would require several international members. It is noted that it is currently within the powers of each RAE panel to call in external expertise where it is considered necessary.

RECOMMENDATION 34

The University agrees that the full costs of all projects should be met by the Research Councils, but only on the understanding that this should not be financed by a transfer of funding from the Funding Councils. It is noted that both the quantity and quality of research in the UK have improved—particularly since 1992 when the full RAE linkage to funding was introduced; no comparable increase has been brought about by any other means including Research Council funding, and this improvement should not be undermined by any further decrease in the funding available to Funding Councils for quality related (QR) allocations based on RAE performance.

Dearing proposes that Departments which consider themselves unlikely to reach the upper 3 (3a) grading should not enter the RAE at all. The University supports the retention of funding from the Funding Councils for research groups rated 3b. Surely it is anomalous that, having recognised a 3b area has having "research quality that equates to attainable levels of national excellence in the majority of sub-areas of activity," there would be no research funding allocated.

The University supports the principle that all teaching should be underpinned by research and that scholarship in teaching should be rewarded. However any special funding or reward for "research and scholarship which underpins teaching" should be provided through the teaching funding model rather than the research funding model. Given that in over 100 institutions RAE submissions are not currently made across a wide range of areas, the funding implications of the proposal could be substantial and could erode funds available to reward research performance, if allocated from the research model. The promotion of scholarship in teaching is more properly dealt with through the teaching funding model.

The University supports the establishment of an Industrial Partnership Development Fund to attract funds from industry and to contribute to regional economic development. It is noted that in NI the Industrial Research and Technology Unit (IRTU) fulfils a related function, and has contributed greatly towards regional economic and social development. The University wishes to support continued effort by this means.

The University recognises the need for funding to finance research infrastructure but takes the view that the suggested setting up of a revolving loan system would face major difficulties. Firstly, as it is proposed to set up the fund specifically to finance infrastructure and not IPR, there would be no profit generated to finance the loan. Secondly, as private sector funding generally is scarce, interest on the investment would be sought. However, unless the loan fund was interest free it is likely that Universities would be unable to repay borrowed money. In any event if IPR earnings were likely, funding for such an investment would be available without a central loan fund in place.

Recommendation 35

The University recognises the need for greater accountability in the distribution of research funding and the development of a transparent process of fund allocation with a particular regional emphasis. It is felt, however, that this may be brought about by closer collaboration between existing agencies, rather than by the establishment of one overall advisory body. The introduction of a periodic assessment of achievement to ensure "value for money", together with a system of regular meetings between OST, Research Councils, Funding Councils and Charities would promote greate productivity through optimal use of research funding.

Recommendation 36

The University supports the recommendation that there should be Higher Education representation on Higher Education regional bodies and on Further Education Funding Council regional committees.

Recommendation 37

The University strongly supports the recommendation that there be a replacement for the Higher Education Regional Development fund due to lapse in April 1998, but efforts should made to ensure that the Fund is managed so as to produce lasting benefits. There should be consultation about the use of the Fund.

Recommendation 38

The University supports the recommendation that there should be early and co-ordinated access to information on services provided to SMEs by Universities and notes IRTU's role in Northern Ireland in working with the universities to publicise the universities' available expertise and facilities.

Recommendation 39

The University strongly supports the establishment of a fund to provide equity funding to institutions to support the development of incubator units.

Recommendation 68

The University of Ulster would wish to maintain an appropriate balance between regional, national and international collaborations for the benefit of Northern Ireland. The RAE can, in fact, encourage collaboration within and between institutions through the possibility of including jointly authored publications in more than one submission.

In the context of the regional contribution of University research, the University has been disappointed by the actual and further threatened reductions in university research funding in Northern Ireland and draws to the attention of the Committee the impact of these cuts which are bound to undermine economic regeneration including inward investment.

Postgraduate Research Student Recruitment

The University is concerned that proposals for the abolition of the undergraduate maintenance grant combined with the requirement to contribute to tuition fees would result in debt which would discourage the best students from embarking on a three year research degree. It is suggested that innovative means of attracting graduates to undertake full-time research studies shoud be considered as a matter of urgency, otherwise highly rated research groupings could experience real difficulty in recruiting the students who are necessary for the conduct of research programmes.

18 December 1997

APPENDIX 29

Memorandum submitted by the Association of Independent Research & Technology Organisations

1. AIRTO Supports the CBI Submission

AIRTO supports the views expressed by the Confederation of British Industry (CBI) in their Memorandum to the Committee (reference M24 97—October 1997). What follows in this Memorandum are additional views held by the AIRTO Board and Council.

2. Proposals for an Independent Advisory Council on National Research Policy

AIRTO supports the need to develop and sustain a national research policy. However, it is not convinced that creating new bodies is the solution to this problem. Instead, it would prefer to see rationalisation of existing structures to produce sharper focus.

AIRTO wishes to see the adoption of a holistic view in national research policy but one which also sets objectives to achieve focus. This must embrace—HEI research policies, Research Council policies, Foresight Steering Group and Panels policy, Challenge programmes policy, government departmental initiatives for innovation, government fiscal policies aimed at nurturing innovation and R&D, private sector research activities, company research centres, RTOs, European Commission research programmes etc. These all make up the market environment in which a research policy must be developed and sustained. Any attempts by government to create new infrastucture for research policy should centre on coherence, complementarity and priority among these different elements. Overall research must contribute to enhanced quality of life, enhanced competitiveness and greater wealth creation in the UK.

AIRTO supports Foresight as one essential driver of research policy. Wordwide evidence suggests that such an approach is valid in focusing research resources and stimulating excellence. It follows that if there is commitment by government, industry and academia to the concept of Foresight, it should be used to provide a defining and driving mechanism for research policy. This requires all departments of government to support enhanced resources for OST-managed Foresighting. The links between Foresight and industry should be strengthened to match the synergy achieved already between Foresight and Research Councils. AIRTO believes it has a policy contribution to make in this harmonisation process and is willing to provide expertise and resources for this purpose.

3. The Teaching Role of HEIs

AIRTO regards the teaching role of universities to be of equal, or even greater, importance than the role of research in HEIs. In support of this view there is the example of post-war Japan. In a state of post-war deprivation, Japan did not invest heavily in academic research. However it continued to sustain university teaching and the process of global knowledge transfer into the Japanese academic community. The result was that Japan sustained a flow of well educated people able to leverage industry performance—particularly in new technologies and new approaches to manufacturing. It first created the wealth which led to the means to fund subsequently an increasing programme of academic research.

While the UK does not suffer a situation comparable to post-war Japan, there are competing pressures in society and government for public funds. As a result overall investment in academic research has been in decline. Investment has fallen, in real terms, from £6.8 billion in 1987–88 to £5.6 billion proposed for 1997–98 (using 1996 as the base year figures from the 1997 government Forward Look).

While AIRTO holds the view that the decline in academic research funding must be reversed, AIRTO also recommends that the teaching function of universities should be given equal status as that of research activities. It is inevitable that the cost of research is likely to increase. This means government, industry and academia must recognise that if international standards of excellence are to be maintained in HEI research, then some selectivity will have to be introduced. The argument that compensation may be found through industrial sponsorship is unrealistic. Recent DTI reports on university research/industry relationships support this view.

4. The Role of HEIs in Local Communities

In similar vein to the preceding paragraph AIRTO views with caution advocacy that universities should play an increasing role in their local communities. The university as a local institution, will stimulate cultural, creative, scientific, engineering and technology interest at the local or regional level. This always has been a societal function of a university and should be encouraged. However, recent attempts—particularly under the previous administration—which seek to place undue emphasis on local delivery of services and regional infrastructure are misplaced in a global environment which is shrinking due to enhanced communications. There is a further danger in this localisation policy. It may become an argument to use universities as local providers of consultancy at unrealistic market pricing, thus distorting the real market for knowledge transfer. The result of this policy is frustration in the HEI—due to lack of real funding support—and dilution of the HEI effort which would be better utilised in the primary task of teaching.

5. The Costing of Research by Universities

AIRTO supports the view of the CBI that universities should cost properly and fully their research activities. It follows that Research Councils should then fund fully such research activities.

6. Research Assessment Exercise (RAE)

AIRTO recognises the arguments put forward for Research Assessment. However, the present system does not appear to be effective. It provides inappropriate incentive for all universities to seek high research quality status. Although the criteria used in RAE are reasonable, it fails to take adequate account of research relevance to the national economic interest. Low priority is placed on the needs of industry. A new approach is needed for Research Assessment. Consideration should be given to focusing entirely on centres of excellence funded for fixed periods of time, eg five years. Alternatively HEIs could be left to create research excellence and then award funding on a competitive bid basis from Research Councils. This would be a market approach to the management of standards in the individual HEI.

7. Centres of Excellence

The concept of Centres of Excellence in HEIs is worthy of nurturing. It means creating a relationship between the topic focus of such centres and the recommendations from Foresight. Such linkage will ensure that centres operate at a fundamental discipline level, but with relevance to topics such as the Information Society. In assessing ideas such as Centres of Excellence account should be taken of the models provided by the Postgraduate Training Programme (PTP) and the new Faraday Centres. Both are successful demonstrators of centres of excellence which combine the best of academic and industry applied research principles. The record of PTPs is of spectacular success when measured by any criterion. Thus for the future centres of excellence should not be perceived as exclusively located in an HEI. In advocating such an approach AIRTO is simply arguing the case for development of PTPs and the emulation of the successful Fraunhofer concept in Germany.

8. Collaborative Research and Sharing of Research Facilities

The Open University has demonstrated the validity of using distance learning techniques in higher education. There is a similar trend in research activity in industry. Many companies with research and development facilities are now linking those facilities through networks and multimedia.

SuperJanet is an example of successful networking of knowledge in the academic world. There is a strong argument for opening, albeit on a qualified basis, access to SuperJanet for researchers in industry. The whole question of designing virtual research centres and networked activity is worthy of further examination. It could be a way of lifting the quality of the best research in the UK (by global networking) and by additional networking to distribute research experience and information to those HEIs with a primary focus on teaching rather than research.

9. Industrial Partnership Development Fund (IPDF)

AIRTO supports the CBI view in recommending that Foresight be used as a central driver of the prioritisation of research themes for the future. AIRTO welcomes the recent revision by OST of the Foresight Steering Group. AIRTO recommends that this Steering Group should become the policy determinant for Foresight. It should have direct influence over the quality of Panel activities to ensure that Foresight is a lead mechanism for prioritisation of research themes and topics in the national interest. The idea of academic/industry partnerships to provide development funds is worthy of consideration. However, much effort will be needed to develop confidence by industry that such partnerships are beneficial. The Dearing proposals do not seem to offer an adequate level of definition for this concept to be accepted. The subject is dealing with the critical issue of knowledge transfer which achieves value-added benefit within an industrial budget horizon. There are still many unanswered questions in the UK concerning research infrastructure and the creation of a knowledge market. AIRTO has recently put proposals to the Minister for Science, Energy and Industry on this subject. It recommends consideration of this report to the House of Commons Science and Technology Committee.

January 1998

APPENDIX 30

Letter to the Clerk of the Committee from Professor Alistair MacFarlane

Thank you for your letter of 26 February. In preparing for the interview by the committee, I had made enquiries about the time and effort which is being expended in preparing and making applications to other research funders. One of the senior academic officers at a leading research university (Edinburgh) told me that this was a matter of great concern, and that as much as 85 per cent of the time notionally supported by R money from the Funding Councils could be being used in this way by some groups.

Thus I did use the figure of 85 per cent, but it would be clearer to put this in context. This could be done by saying, for example . . . "in some cases, where considerable effort is being expended in raising funding from other sources, a great deal of the time notionally supported by R money is in fact being spent on this activity and a figure of as much as 85 per cent of some group's allocation has been quoted as being consumed in this way at one leading research university".

The essential point is that, as the dual funding system comes under severe pressure, research workers' time is being diverted into fund-raising to an extent which is undermining the value and proper purpose of the R allocation. I hope that this is helpful.

2 March 1998

APPENDIX 31

Supplementary Memorandum submitted by the Higher Education Funding Council for England

THE COUNCIL'S RECENT INITIATIVE TO SUPPORT ARTS AND HUMANITIES RESEARCH PROJECTS

Introduction

1. Under the dual support system, public funding for research is provided both through funding council grant and through project and other responsive funding via a research council. Unlike the sciences and social sciences, the humanities and arts do not benefit from dual support.

2. The Follett report of 1993 recommended the establishment of a Humanities Research Council, but this was rejected by the Government. More recently, the Dearing Committee recommended the establishment of an Arts and Humanities Research Council (AHRC), but the Government has not yet made a decision about this.

3. In our response to the Dearing Committee, we supported the recommendation for an AHRC, and said that if additional funds were not provided for such by the Government we would need to consider whether it would be possible to provide some element of project funding for the humanities, though this would only be for a limited period.

4. In its letter of 27 November 1997, the Department of Education and Employment asked the Council to have particular regard to the needs of the arts and humanities for research funding.

5. Against this background, at its meeting on 16 December 1997, the HEFCE Board agreed to provide funding for research project funding in the arts and humanities and the officers of the Council subsequently entered into discussions with a number of interested parties as to the most appropriate structure for providing this.

Summary

The council will provide new special funding for research grants in the arts and humanities of £1.5 million in 1998–99 and £2.5 million in 1999–2000. Further money will be provided by freezing the rebasing of the subject quanta in humanities subjects and a partial freezing in arts: this will yield £6.5 million in 1998–99 and a further £6.5 million in 1999–2000 (£13 million altogether).

The British Academy has indicated a willingness to play an active role in the formation of a funding body (Board) and it would seem appropriate to bring their Humanities Research Board (HRB) within the remit of this initiative and to build on the HRB's past success, but the new body must be different to, and distinct from, the HRB to have credibility in its wider role.

The Council's initiative has been broadly welcomed by the Humanities and Arts communities in the continuing absence of any Government decision to find additional resources. However, it seems prudent that we should establish only a transitional arrangement which will not preclude government or other funders from putting in place a full-blown research council for arts and humanities over the longer term.

The Scottish Higher Education Funding Council (SHEFC) and the Higher Education Funding Council for Wales (HEFCW) have both indicated that currently they do not wish to join with HEFCE in this initiative. However, this will not preclude SHEFC or HEFCW drawing on the expertise of the Board and the option for SHEFC or HEFCW to join the initiative remains open.

1. *What will be the budget of the board and where will this money come from?*

The Council's initial contribution to the budget of the Board will be set partly by reference to monies released by the rebasing of the subject quanta, partly by transferring existing special funding (for Museums, Galleries and Collections, and perhaps for Specialist Research Libraries in the Humanities) and partly by the special funding specifically identified at the December Board meeting to support project funding in the arts and humanities.

At its meeting on 16 December 1997, the HEFCE Board agreed to provide new special funding for research grants in the arts and humanities of £1.5 million in 1998–99 and £2.5 million in 1999–2000. Freezing the funding reductions that would have resulted from the rebasing of the subject quanta in humanities subjects in 1998–99 and 1999–2000, and by reducing the gain to arts subjects will yield £6.5 million in 1998–99 and further £6.5 million in 1999–2000 (£13 million altogether). Transferring existing special funding for Museums, Galleries and Collections would add a further £9 million, whilst that for Specialist Research Libraries in the Humanities would see £6 million brought within the remit of the Board.

2. *How will the board operate in relation to the Humanities Research Board (HRB) of the British Academy?*

We have had a number of productive discussions with representatives of the British Academy and its Humanities Research Board, as the proposed activities of the new Board will overlap with those carried out at present by the HRB. The British Academy has indicated a willingness to play a role in the formation of the Board and we would wish to be sensitive to the fact that the HRB has established a credible track record as a provider of research grants in the humanities, mostly through postgraduate studentships, and that it employs a considerable number of staff to carry out those functions; it would therefore seem appropriate to build on these structures. However, the remit of the new body will be different to that of the HRB and, although perhaps based on the HRB, will need to be seen to different and distinct.

3. *Do you envisage this development as a long-term feature for Arts and Humanities funding?*

It seems prudent that we should establish only a transitional arrangement which will not preclude government or other funders from putting in place a full-blown research council for arts and humanities over the longer term. However, such a transitional arrangement should lay the foundations for an appropriately funded Arts and Humanities Research Council; it should be capable of an easy transition into such a body at the appropriate time.

4. *Does the establishment of this board mean, in any way, that HEFCE no longer supports the creation on an Arts and Humanities Research Council?*

We said in our response to the Dearing Committee that we supported the recommendation for an AHRC, and we continue to do so. However, we also said that "if additional funds were not provided for such by the Government we would need to consider whether it would be possible to provide some element of project funding for the humanities, though this would only be for a limited period". This remains our position.

5. *Will the board be duplicated by other funding councils? If not, will it deal with Arts and Humanities Research throughout the UK?*

The Scottish Higher Education Funding Council (SHEFC) and the Higher Education Funding Council for Wales (HEFCW) have both indicated that currently they do not wish to join with HEFCE in this initiative and will not be duplicating the arrangements being considered.

However, this will not preclude SHEFC or HEFCW drawing on the expertise of the Board when seeking to make funding allocations nor would the Board function in ignorance of arts and humanities funding strategies in Scotland and Wales.

The option for SHEFC or HEFCW to join the initiative would always remain open.

6. *If an Arts and Humanities Research Council is to be created, where within the Government do you think it should be located?*

This is a matter for the Government. The HEFCE receives its funds from the DfEE.

6 March 1998

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